

DECEMBER, 1937

# Railway Engineering Maintenance

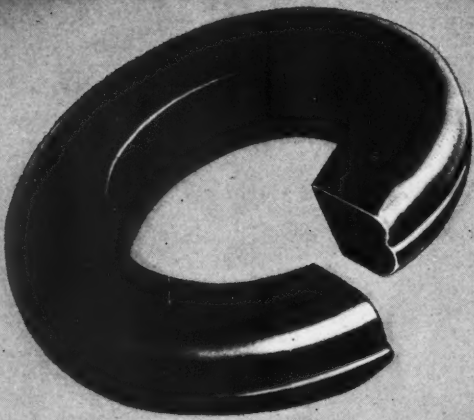


*...a Merry Christmas and*

*a very Happy New Year..*

THE NATIONAL LOCK WASHER COMPANY

# Reliance HY-CROME Spring Washers



HY-PRESSURE HY-CROME  
*Edgemark of Quality*

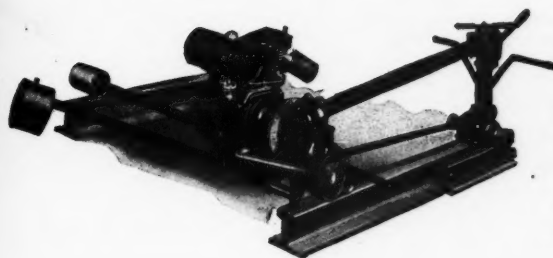
● A joint assembly under HY-PRESSURE HY-CROME SPRING WASHER tension shows less wear over a period from impact loads and intermittent stresses . . . HY-PRESSURE HY-CROME SPRING WASHERS automatically compensate for wear and lengthen maintenance periods prolonging the life of joint parts . . . HY-PRESSURE HY-CROME "The Edgemark of Quality" provides maximum reactive values . . . wide reactive range . . . non-fatiguing and sufficient holding power . . . all in excess of A. R. E. A. Specifications.

EATON MANUFACTURING COMPANY  
RELiance SPRING WASHER DIVISION  
MASSILLON OHIO



One of the Six New ROCKETS  
THE CHICAGO, ROCK ISLAND AND  
PACIFIC RAILWAY CO.  
Chicago to Peoria—161 miles in 160 minutes

## Raco Power Track Machine

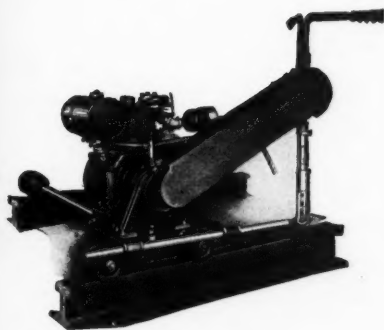


Over 300 on 50 railroads have established remarkable records for economy.

Ease of operation, light weight, automobile type construction insure maximum speed and minimum service interruptions.

Tightening out-of-face with the Raco lasts several times as long as hand tightening and insures uniform tension on all bolts.

## Raco Tie Boring Machine



Bores holes for screw spikes or cut spikes.

Bores ties in track more than twice as fast as any other accepted means.

Bores holes absolutely vertical.

Locates all holes exactly in center of tie plate punching.

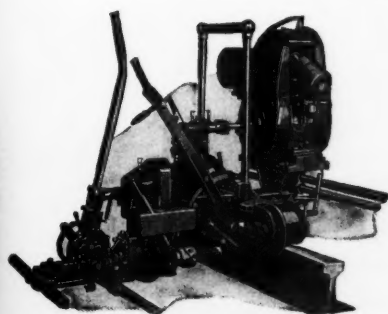
Automatically controls depth of hole.

Chips are blown away as fast as made, leaving hole clear.

One-man operation.

Machine can be removed from track by one man.

## Everett Power M-W Machine



For ten years the Everett M-W has been the standard power rail drill on practically all railroads.

Its design and construction insure the utmost in facility of operation and in speed and accuracy of adjustment.

It has made such astonishing records for economy that no road can afford to use any other means for drilling bolt holes.

## RAILROAD ACCESSORIES CORPORATION



MAIN OFFICE  
405 LEXINGTON AVENUE  
(Chrysler Building)  
NEW YORK



# EVERTITE *Rail Joint*



## Radically Different Design Gives Radically Improved Performance

When rails were first laid the method of joining them was a simple matter—fish plates were bolted on each side of the rail. With the low speeds and light loads of those days such a method was adequate enough.

But radical changes in train design and greatly increased speeds, coupled with today's tremendous loads, finds this early conception of track joining no longer adequate.

EVERTITES were engineered to do everything the fish plates did and do it better—but in addition EVERTITES provide a controlled crown at rail ends to compensate for increased deflection and give an adjustment to put back crown losses. By this improved method of

joining an uninterrupted wave motion is permitted thru the joint, joint hard spots in track are eliminated and maintenance cost is reduced while life of rails and equipment is being lengthened.

That the improved EVERTITE of today is the last word in rail joining is being proved on hundreds of miles of track throughout the country. It will pay you to see what EVERTITES are doing on other roads—to learn what they will do on yours.

STANDARD EQUIPMENT, INC.  
70 EAST 45TH STREET, NEW YORK  
Chicago Office: 310 South Michigan Ave.

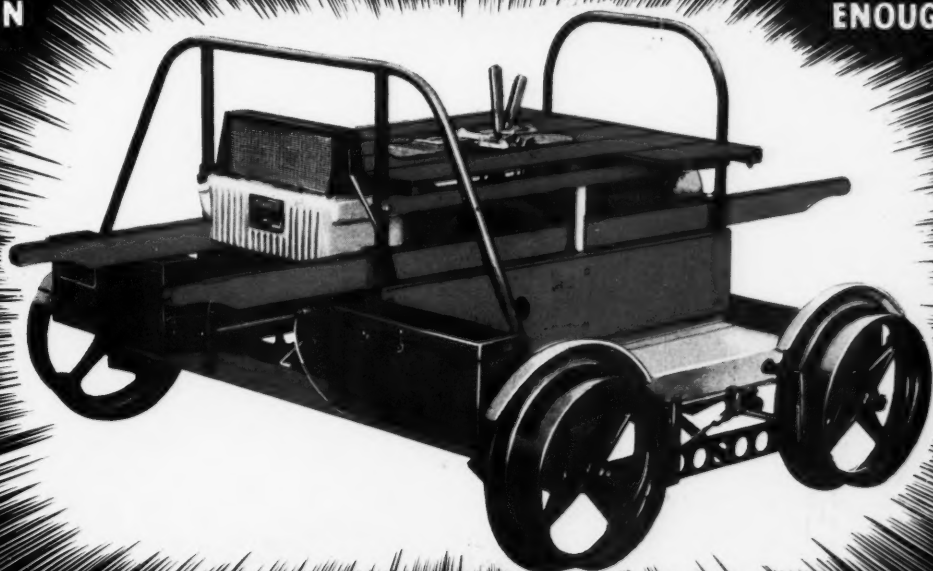
THE NEAREST APPROACH  TO CONTINUOUS RAIL

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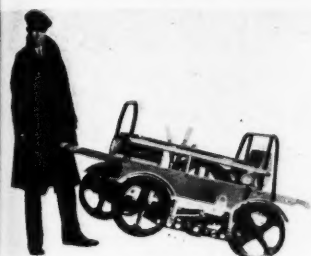
# Performance ON THE JOB COUNTS

ROOM FOR  
TWO MEN

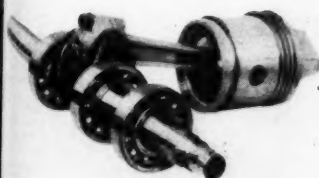
YET LIGHT  
ENOUGH FOR ONE



## Fairmont M9 SERIES B



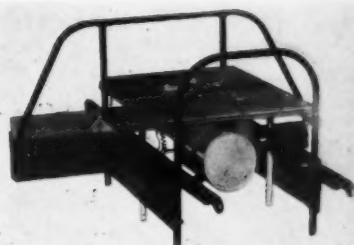
• The weight at the rear is only 85 pounds, which makes the M9 the most easily handled of all light cars.



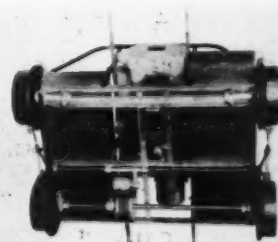
• Excess weight in the engine is eliminated by the use of Lynite Aluminum Alloy in the piston and connecting rod, permitting smooth and flexible operation. Three ball-bearings on the crank-shaft maintain perfect alignment.

Roadmasters, signal maintainers and linemen are enthusiastic about the performance of the Fairmont M9 Series B. It is the lightest inspection car for one to two men. The rear lift is only 85 pounds. Aluminum Alloy minimizes weight without sacrifice of strength. You can use the M9 on any run—where grades are steep and loads are heavy or when using a windshield. Its 5-8 H. P. Fairmont engine has ample reserve power to make good time under the most difficult conditions. It idles (without balking) for slow speed inspection. It is long on dependability and light on fuel consumption. Before you select any inspection equipment send for complete facts on this modern light weight car.

FAIRMONT RAILWAY MOTORS, Inc.  
FAIRMONT, MINNESOTA



• For inspection and maintenance, seat top is made quickly detachable. The entire housing can also be easily removed.



• Note the rugged construction of the chassis, with the sturdy cross members of aluminum alloy. Demountable wheels save time and cut costs in renewing tires, as the hub does not have to be pulled from the axle.

OF ALL THE CARS IN SERVICE TODAY

MORE THAN HALF ARE FAIRMONT'S



These WD Posts with middle rails were installed at a new freight house erected in connection with track elevation. The tracks descend toward the busy street which the posts protect. The tower of the county court house is in the upper left

When recent railroad improvements are discussed the mind naturally turns to streamlined trains, centralized train control, new stations and grade separations.

But among the less spectacular things there has also been much progress. Think of bumping posts twelve years ago. Bent rail posts were much in vogue. A large section of a tree stood erect in some. Engineers tried in vain to build a concrete post which would give good service. The ideal was mass, whether of rails or wood or concrete. They all failed because the mass of the biggest post, even with a heavy

cast iron head, was only a minor fraction of the mass of the cars which struck it.

No one had yet built a post of rolled steel sections right for the stresses to be carried; nor used the modern art of welding to join the parts; nor simplified the post until there were only two pieces in a complete post; nor used a few chrome nickel track bolts of double strength instead of many bolts of ordinary steel; nor provided a firm track foundation for the post by the use of middle rails.

Every one of these radical improvements is built into the Hayes Type WD Bumping Post.

Hayes Track Appliance Co., Richmond, Indiana



# AIRCO

## WELDING PRODUCTS

have  
*Universal Applications*  
in the  
Maintenance-of-Way  
Department

**T**HE ever-increasing applications of oxyacetylene operations in Maintenance-of-Way work largely owe their present high degree of perfection to major developments of AIRCO PRODUCTS and TECHNIQUE.

- The AIRCOWELDING process of reconditioning battered rail ends is, for example, now *standard* on many leading roads.
- The AIRCO method of heat-treating and reforming rail ends shows that rail end batter can be prevented.
- Welded Track Bonds are rapidly replacing wire bonds. As a result, train delays are being decreased and operations improved.
- Frog and Switch Point reclamation by the gas torch effect tremendous savings.
- Pipe welding, repairs to bridges, track tools, switch stands, motor cars, water tanks and many other miscellaneous jobs also effect worth while savings in time and money.

Our engineers gladly offer complete AIRCO facilities in any welding studies or problems that may confront you.

## AIR REDUCTION

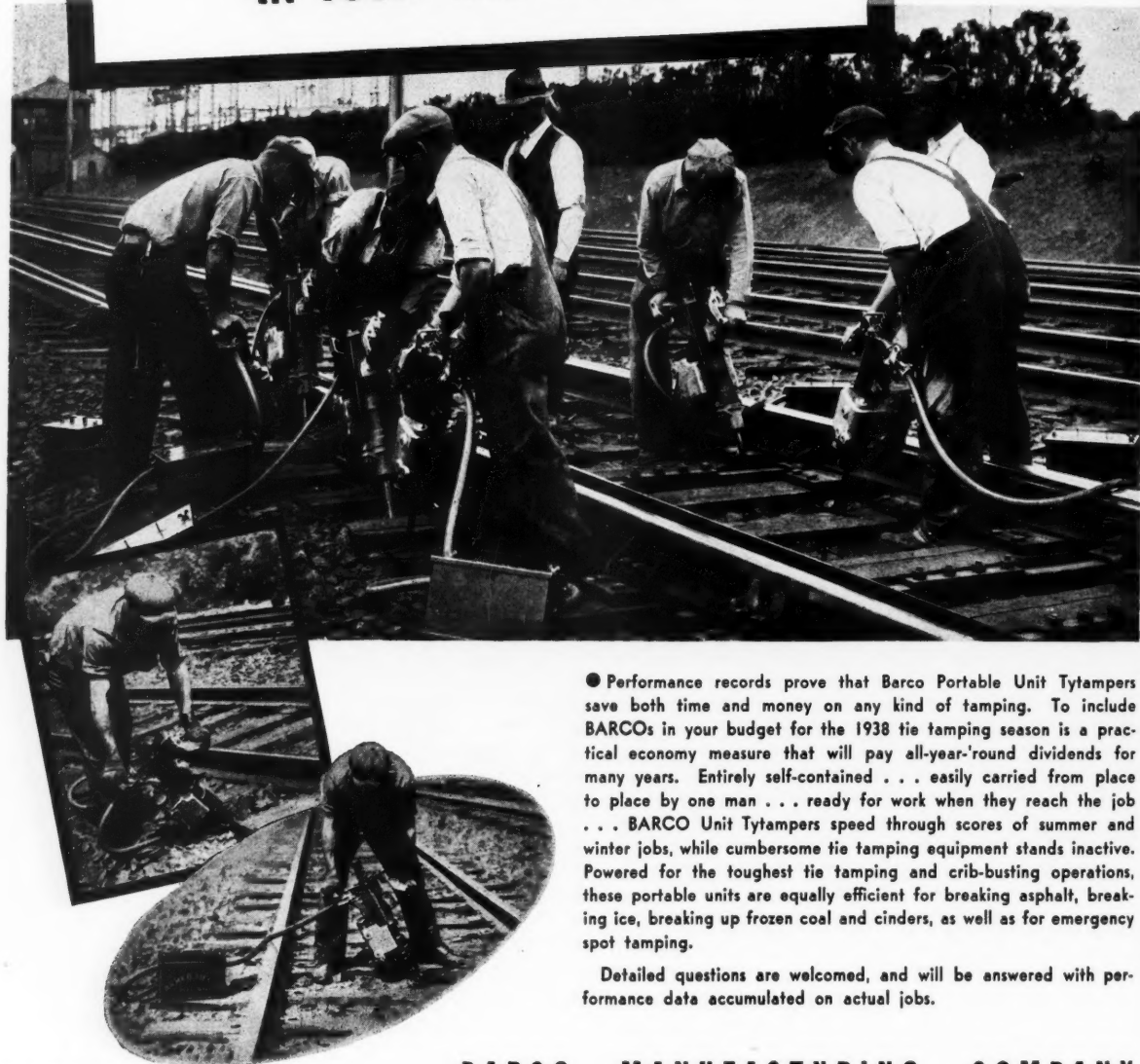
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General Offices: 60 East 42nd Street, New York, N. Y.

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A NATION-WIDE WELDING and CUTTING SUPPLY SERVICE

*For* **PRACTICAL Economy**  
**INCLUDE BARCO UNIT TYTAMPERS**  
**IN YOUR 1938 BUDGET**



● Performance records prove that Barco Portable Unit Tytampers save both time and money on any kind of tamping. To include BARCOs in your budget for the 1938 tie tamping season is a practical economy measure that will pay all-year-round dividends for many years. Entirely self-contained . . . easily carried from place to place by one man . . . ready for work when they reach the job . . . BARCO Unit Tytampers speed through scores of summer and winter jobs, while cumbersome tie tamping equipment stands inactive. Powered for the toughest tie tamping and crib-busting operations, these portable units are equally efficient for breaking asphalt, breaking ice, breaking up frozen coal and cinders, as well as for emergency spot tamping.

Detailed questions are welcomed, and will be answered with performance data accumulated on actual jobs.

32 Railroads Have Now  
 Ordered BARCO Portable  
 Gasoline Hammers or Unit  
 Tytampers.

**BARCO MANUFACTURING COMPANY**

1805 W. Winnemac Ave., Chicago, Ill.

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**BARCO UNIT TYTAMPER**

# PERMANENTLY REPAIRED

## WITHOUT INTERRUPTING TRAFFIC



**W**HEN this large masonry culvert showed signs of weakening, the maintenance department promptly *relined* it with an Armco Multi Plate Arch. This way they obtained a *permanent* repair job without interrupting traffic, and with only slight reduction of the original waterway area. Then, too, the work was completed quickly and at low cost.

Armco engineers are ready to help your

maintenance staff achieve similar results in repairing or replacing large drainage structures. Just address our nearest office: Ingot Iron Railway Products Co. (Member of the Armco Culvert Mfrs. Assn.) Middletown, Ohio; Berkeley, California • Dallas • Atlanta • Philadelphia • Salt Lake City • St. Louis • Minneapolis • Los Angeles • Cleveland • Portland • Spokane • Richmond • Denver • Chicago • Houston

**ARMCO****MULTI PLATE**

A PRODUCT ORIGINATED AND DEVELOPED BY ARMCO ENGINEERS

**TO RAILWAY SUPPLY MANUFACTURERS***Speaking of Essentials*

An essential element in any plan to sell engineering and maintenance of way materials to the railways is the complete but highly selective circulation of

**Railway Engineering and Maintenance**

—the magazine that is read first and most widely by the men who are selecting and specifying the materials and devices that will be used in next year's program.

**RAILWAY ENGINEERING AND MAINTENANCE IS  
READ BY MAINTENANCE OFFICERS OF ALL RANKS**

# A GUARD RAIL



This Bethlehem guard rail hooks under running rail. No rigid clamps; no chance of guard rail overturning.

***that cushions impact***

**W**ITH a smooth, cushioned action the Bethlehem Hook-Flange Guard Rail eases fast-moving wheels past a frog or into a facing-point switch. No jerk. No impact that can crack wheels or snap off the heavy clamps of an ordinary rigid guard rail.

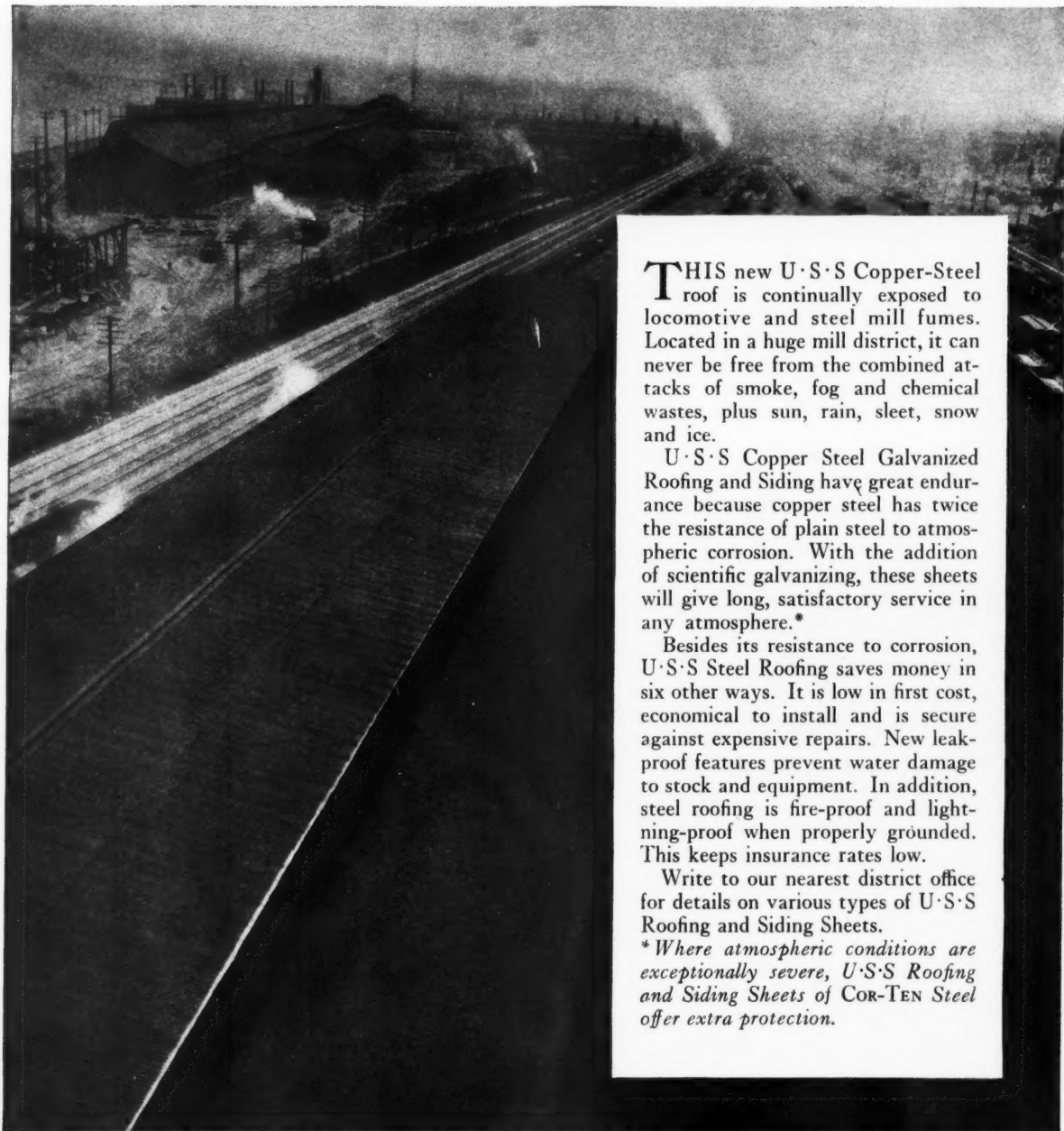
The Hook-Flange Guard Rail works on an entirely different principle from other types. Note its design. No clamps. Instead, the guard rail hooks under the running rail in such a way that the weight of the train prevents tilting; a shoulder on the tie plate prevents the rail from moving out of position.

As the wheel enters the turnout, the guard rail "gives," absorbs the shock. Smoothly it straightens the trucks—cushioning side thrust, preventing wheel flanges from battering or fouling the frog point. Because of this slight resilience, service life is lengthened, maintenance reduced. Among the thousands of Bethlehem Hook-Flange Guard Rails already in use, there is not a single record of a failure.



**BETHLEHEM STEEL COMPANY**

# DOWN BY THE RAILROAD is a **TOUGH** place for Roofing



**T**HIS new U·S·S Copper-Steel roof is continually exposed to locomotive and steel mill fumes. Located in a huge mill district, it can never be free from the combined attacks of smoke, fog and chemical wastes, plus sun, rain, sleet, snow and ice.

U·S·S Copper Steel Galvanized Roofing and Siding have great endurance because copper steel has twice the resistance of plain steel to atmospheric corrosion. With the addition of scientific galvanizing, these sheets will give long, satisfactory service in any atmosphere.\*

Besides its resistance to corrosion, U·S·S Steel Roofing saves money in six other ways. It is low in first cost, economical to install and is secure against expensive repairs. New leak-proof features prevent water damage to stock and equipment. In addition, steel roofing is fire-proof and lightning-proof when properly grounded. This keeps insurance rates low.

Write to our nearest district office for details on various types of U·S·S Roofing and Siding Sheets.

*\*Where atmospheric conditions are exceptionally severe, U·S·S Roofing and Siding Sheets of COR-TEN Steel offer extra protection.*

## U·S·S BLACK and GALVANIZED SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago

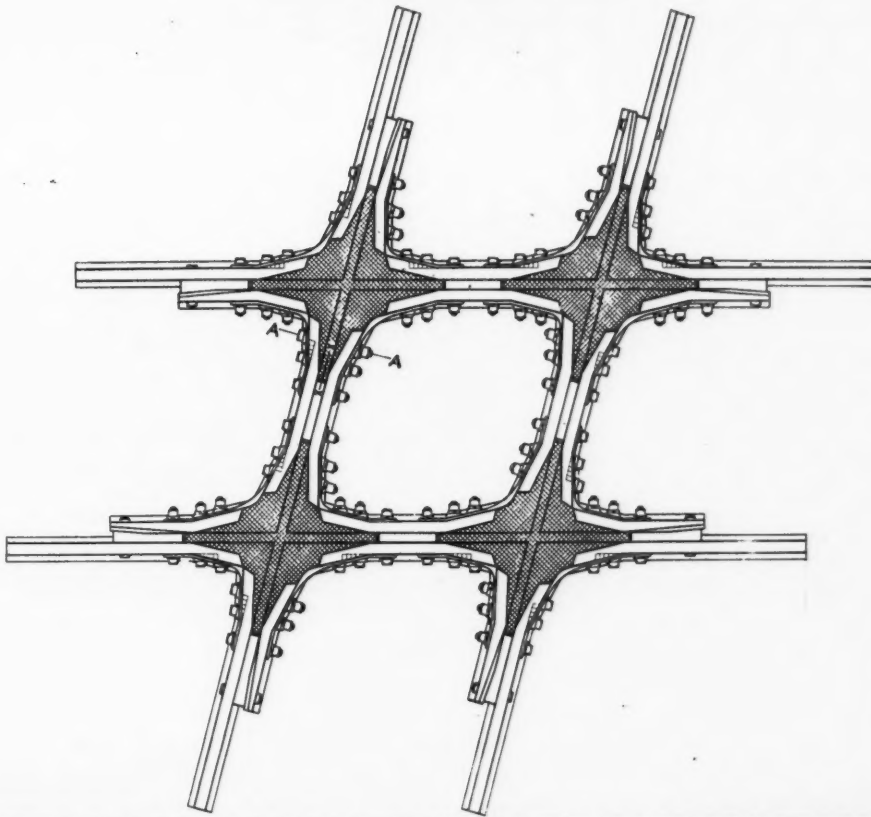
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Columbia Steel Company, San Francisco, Pacific Coast Distributors · United States Steel Products Company, New York, Export Distributors

# UNITED STATES STEEL



## **RACOR CROSSINGS** *with* **REVERSIBLE MANGANESE INSERTS**

are economical because they last a long time, and the first cost compares favorably with other crossings designed for heavy traffic. The fact that the manganese inserts are reversible and interchangeable adds to their economy.

This crossing overcomes troubles caused by too great rigidity and provides long-

wearing manganese surfaces where greatest pounding and wear occur.

Further savings are accomplished by the fact that worn castings can be reversed, thus utilizing the entire surface of the insert before scrapping. Many railroads stock one corner casting for each crossing as a spare to be applied to any corner as needed.



## **RAMAPO AJAX CORPORATION**

**CANADIAN RAMAPO IRON WORKS, LIMITED**

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# CAR SUBMERGED BY RAGING RIVER—FINISH UNDAMAGED

## Flood Disaster Gives Dramatic Proof of Durability of "DUCO" and "DULUX"

### RECEDING WATERS REVEAL FINISH STILL IN PERFECT CONDITION

FOR a while last spring, this street car turned submarine. The swollen Ohio completely buried it under churning water at Cincinnati.

It stayed completely submerged during the entire flood period, exposed to a merciless attack of rush-

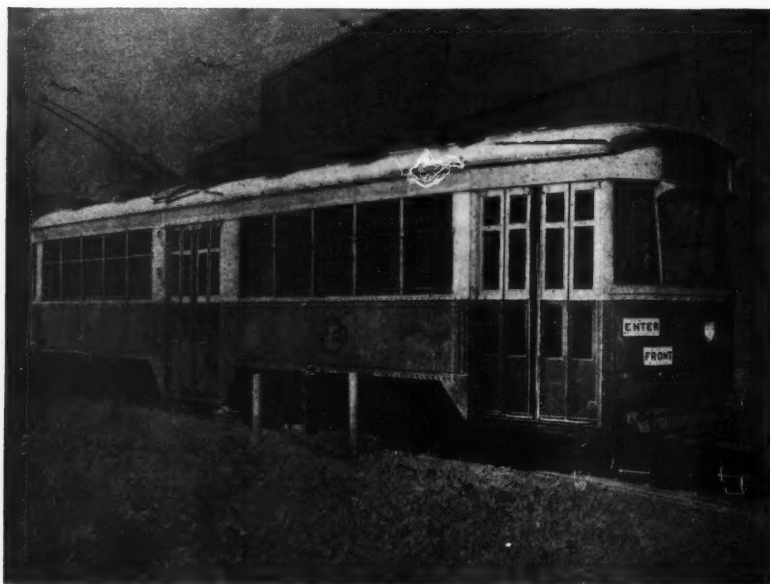
ing debris, mud, and water saturated with the acids, gasoline, oils, dirt and corrosive matter that always accompany floods.

When the waters receded, the finishes on this car, and all the other equipment of the Cincinnati Street

Railway Company finished with Du Pont DUCO and DULUX, were found to be in perfect condition, in spite of this extreme punishment. The steel portions of the exterior of this car are finished in DUCO; the exterior wooden parts and the interior in DULUX.

This amazing example of paint durability is dramatic proof of the way Du Pont Transportation Finishes are saving money for so many modern roads. They keep their fine appearance so *much* longer, they stand up so magnificently under hard service and exposure to every kind of weather, that they cut expensive repairs and repaintings down to the minimum.

A Du Pont representative will be glad to give you complete information about these better-looking, longer-lasting, lower-cost finishes for every transportation purpose. E. I. du Pont de Nemours & Co., Inc., Finishes Division, Wilmington, Del.



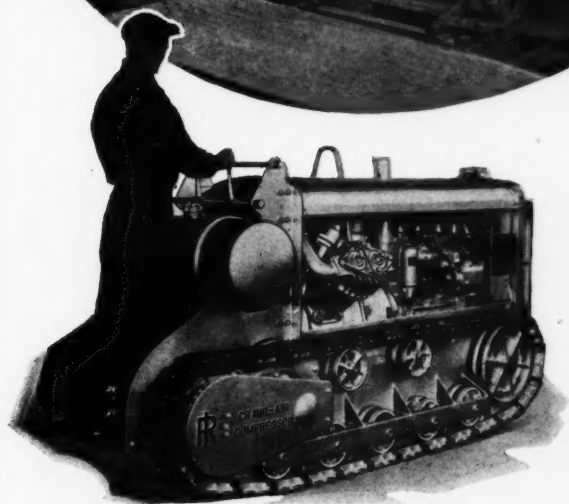
"DUCO" AND "DULUX" ARE REGISTERED TRADE MARKS OF E. I. DU PONT DE NEMOURS & CO., INC.



## TRANSPORTATION FINISHES

MEASURE YOUR PAINT COST BY THE *performance yardstick*—

# IT WILL PAY YOU To Use All of the I-R Labor-Aiding Tools



**F**ROM time to time we have stressed the ever popular light-weight MT-3 tie tamper, the I-R spike driver that puts 'em home, and the speedy spike puller—and their outstanding economy, particularly when used in conjunction with the efficient I-R two-stage air-cooled compressor. But are you benefiting from the many other low air consumption tools that raise your track maintenance standards and at the same time speed up work and save money for you?

The cribbing fork—used in the MT-3 tie tamper—is indispensable in fouled ballast. It provides a quick, economical means for cleaning cribs. The "Multi-Vane" grinder is great for grinding switch points, grinding and beveling rail joints, etc. Other outstanding tools for speeding track work include pneumatic wrenches, rail drills, wood boring tools, the safety-first air saw, pneumatic diggers, backfill tampers, etc.—also a complete line of bridge tools. Let us send you our illustrated booklet describing these tools.

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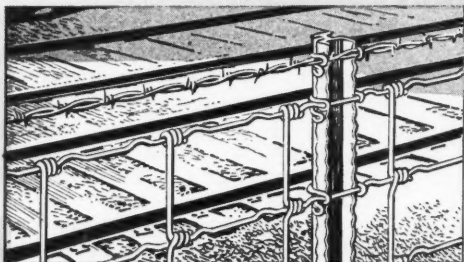
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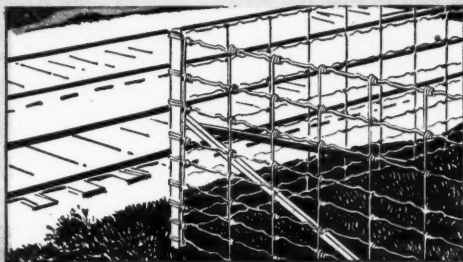
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# IT CAN'T



THESE STURDY BANNER STEEL LINE POSTS designed for use with American Right of Way Fence are easily installed, last longer, and strengthen the fence. One man can drive several hundred of them in a day.



NATIONAL EXPANDING ANCHOR, DIRT SET, CORNER POSTS give strength and economy in installation. They are easily and quickly set, require no expensive and laborious digging of large post holes, and no cement is needed.

# THAPPEN HERE!

*... the costly accident that  
comes from lack of proper fencing*

**W**ITH train schedules stepped up, good right-of-way fencing becomes more important than ever!

American railroads find that sturdy American Railroad Fence and husky American Banner Steel Line Posts are a combination that pays dividends far in excess of their cost.

They reduce accidents. Prevent the expense and ill will caused by injury to live stock. And they save you money on repair and replacement costs because they're built to last.

American Railroad Fence is made of rust-resisting copper bearing steel — smoothly and heavily coated with galvanizing. Wire is medium hard, with just the right "spring" to it. The famous American Hinge Joint has the flexibility necessary to resist the pressure of live stock.

One man can drive several hundred American Banner Steel Posts in a day. The patented slit-wing anchor locks each post in the ground as solid as a rock. Used with National Expanding Anchor End and Corner Posts (dirt set) they make a fence foundation that can't be beat.

Ask for complete information on proper fencing of right-of-way, around shops and buildings, at stations and in yards.



U·S·S ELLWOOD STATION GROUND AND SECTION HOUSE FENCE offers protection against accidents and injury around stations, shops and buildings. In a two-inch mesh this fabric is non-climbable.

## U·S·S AMERICAN RAILROAD FENCE *and* BANNER STEEL POSTS



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United States Steel Products Company, New York, Export Distributors

# UNITED STATES STEEL

No. 108 of a series

## Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.  
CHICAGO, ILL.

Subject: This Changing World

Dear Reader:

December 1, 1937

Have you ever thought how many products are being forced out of the railway picture in this age of such rapid change by their failure to meet the competition of newer and more aggressively promoted materials? If you have not, I suggest that you look back over the materials that you considered standard 25 or 30 years ago and list the products and the manufacturers whom you have long since forgotten.

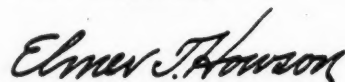
Take cast iron culvert pipe as an illustration. A quarter of a century ago, you will recall, that it was almost universally used in permanent construction for small waterway openings. Yet it has been relegated to the background by the aggressive development and promotion of corrugated metal culverts. And what has happened to cast iron culvert pipe you have seen happen to many other materials and units of equipment.

Indicative of what can be done and is being done by alert manufacturers in other industries to meet new developments, the home heating field comes to mind where the oil burner threatened to drive the coal furnace out of the picture until the coal industry developed the stoker and arrested the invasion of oil. In a similar manner, the electric refrigerator threatened the extinction of the ice industry until it developed a refrigerator that equals its newer rival in appearance, efficiency and cost.

And you can duplicate these illustrations in the railway supply industry where companies, sensing the change in the use of their product, have re-designed and re-adapted it to the newer conditions and thereby improved their service to the railways. These companies are not complaining about the buying habits of the railways or bemoaning their future. On the contrary, they are creating new markets for their goods.

This is a day of rapid change—change that is induced by alert manufacturers developing new or better products and materials but that is induced equally by intelligent, aggressive selling of these improved products. As I have mingled with the manufacturers and salesmen of maintenance materials and equipment during the last 27 years and have seen some companies grow, while others have faded out of the picture, the conviction has grown stronger year after year that the making of a good product is only half the job of a successful railway supply manufacturer. It is also just as necessary to sell that product with energy and intelligence. In your contacts with railway supply companies and their products, I am wondering if you have noted the same trend and have reached the same conclusion.

Yours sincerely,



ETH:EW

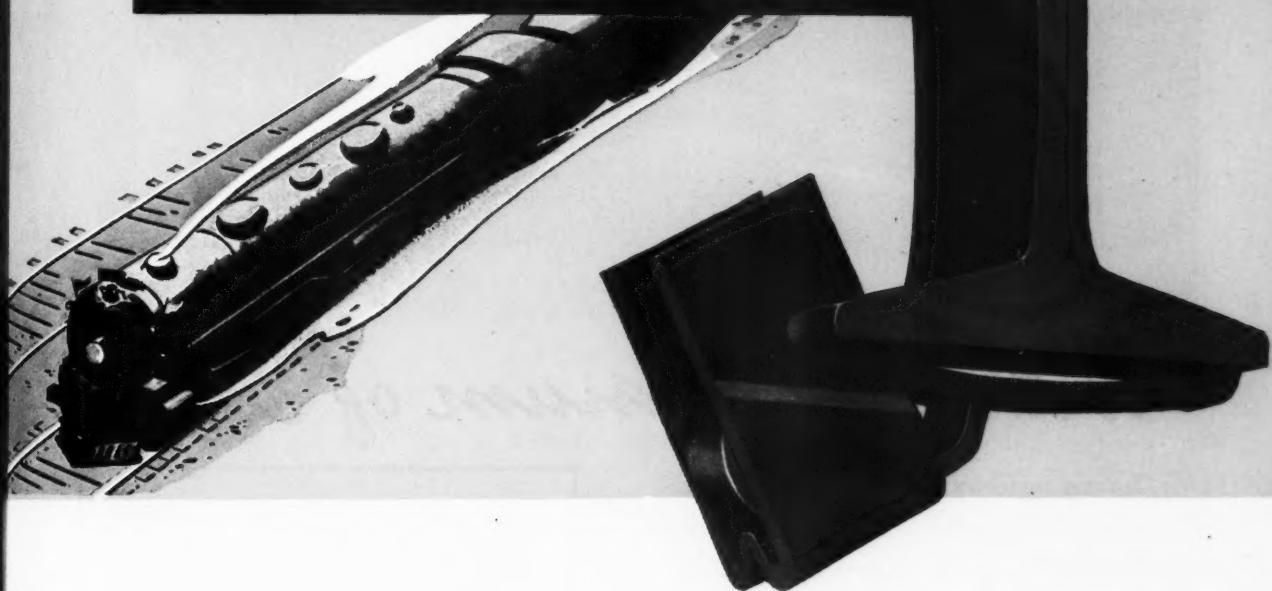
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# "Stead"

## TRUE TEMPER

# Rail Anchors



There is one proved and established method of eliminating rail creepage. This is by the use of an adequate number of Rail Anchors. It is the most economical and practical method. These devices are used

without any change in existing specifications or equipment for track maintenance.

The "Stead" True Temper Rail Anchor represents the ultimate in economy and efficiency.

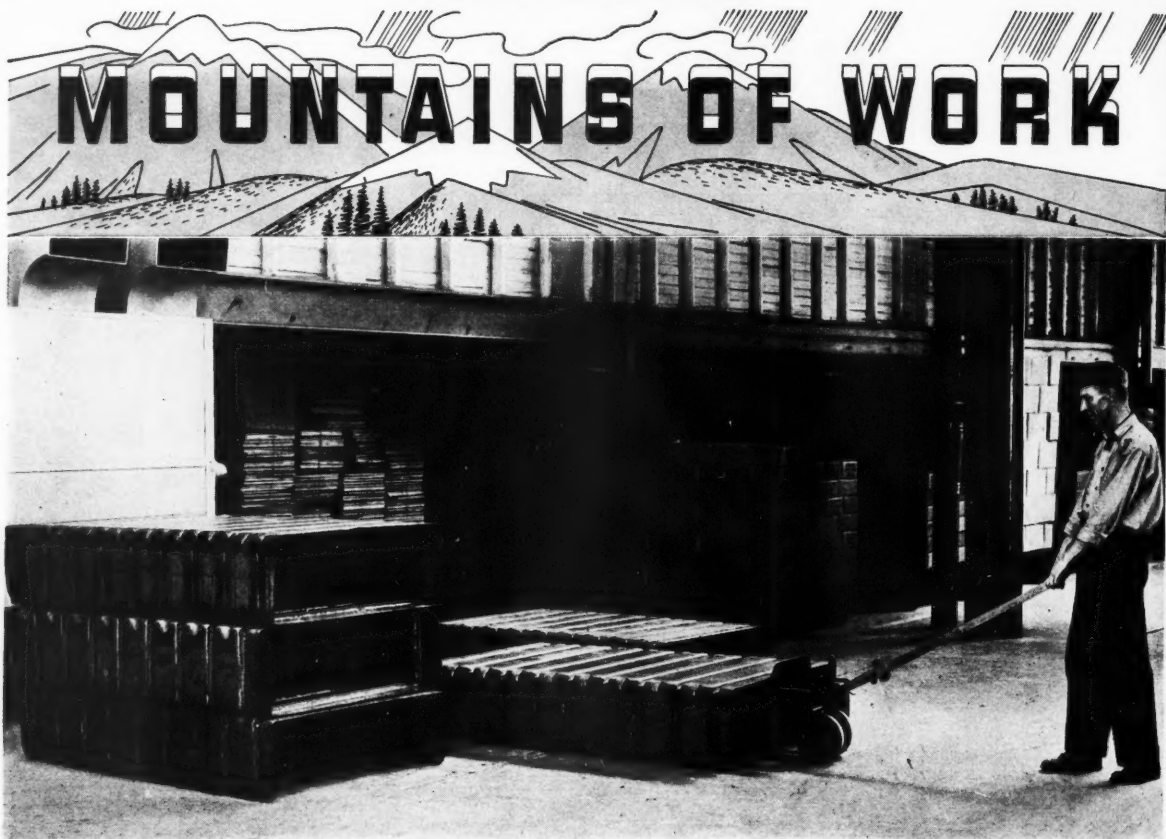
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Truscon engineers have put "muscles of steel" into Truscon materials handling equipment. Deep stiffening ribs are pressed into heavy gauge steel to secure super-strength without an ounce of needless weight. Additional reinforcement is given to Truscon Skid Platforms through an exclusive method of forming the corners. The standard line of Truscon Steel Boxes and Skid Platforms meets most requirements but any special requirement can be handled promptly and economically.

*Write for free illustrated catalog.*



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# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

DECEMBER, 1937

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# Announcing...

## RESULTS OF 32 SERVICE TESTS ON U·S·S BRUNORIZED RAILS

SINCE early in 1934, railroad engineers have been carefully checking the performance of test installations of the new U·S·S BrunORIZED Rails.

For the purpose of the test, 32 locations were selected on the lines of 23 railroads. All kinds of conditions were represented, ranging from ceaseless pounding by heavy freight trains to sudden centrifugal shocks by speeding streamliners—temperatures varying from 121°F. to -60°F.

Without a single exception, these service tests have confirmed laboratory studies.

### HERE ARE THE RESULTS:

1. These rails virtually eliminate the danger of fissures and sudden fractures, even at record low temperatures — because of their refined grain structure.
2. These rails reduce impact from battered rail ends, cut costly track repairs, and will increase average rail life—because they are uniformly end-hardened.

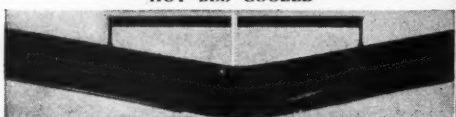
A great mass of evidence, collected from all parts of the country, points convincingly to these facts . . . indicates that the U·S·S BrunORIZED Rail is the finest steel rail it is now possible to produce on a commercial scale. Write for new booklet describing U·S·S BrunORIZED Rails. It's worth your reading.



BRUNORIZED



HOT BED COOLED



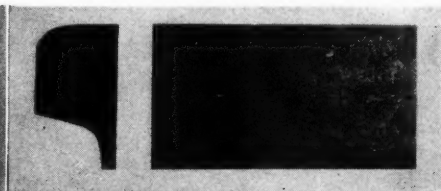
CONTROLLED COOLED

#### DROP TESTS

2000 pounds dropped 20 feet on specimen rails, 48 inches between supports. U·S·S BrunORIZED Rail deflected more, but was unbroken after six blows. Five and six blows, respectively, caused other rails to fracture. Here's evidence of finer grain structure, less tendency to fracture in cold weather.

#### ETCH TESTS

Both rails are given an identical etch. You can easily see how the U·S·S BrunORIZED process produces more uniform end-hardening, even after graduation of structure into the rest of the rail, without any intermediate zone.



End-hardened by USS Brunorizing Process



End-hardened by reheating the ends of hot bed or controlled cooled rails



CARNEGIE-ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, Pacific Coast Distributors • United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL

# Railway Engineering and Maintenance



## The Rate Increase

### Places a Double Obligation on Employees

THE application for increased freight and passenger rates that the railways presented to the Interstate Commerce Commission on November 5 is of direct concern to every railway employee for two reasons. In the first place, favorable action on the petition is essential to the continued solvency of the industry from which he derives his livelihood and the outcome will profoundly influence the future of his industry.

A second consideration is the fact that this increased income is made necessary in part by the increases in wages that have been granted railway employees in recent weeks, including those in the maintenance of way department. For both of these reasons, an obligation rests on maintenance employees to inform themselves about the present needs of the railways in order that they, in turn, may be able to present the merits of this petition for increased income to those with whom they come in contact in order that the public, with the facts before it, will favor the granting of the increase as being in the public interest.

The proposal of the railways contemplates a horizontal increase of 15 per cent in all freight rates, with a few exceptions where slightly lower maxima are proposed. The railways in the East also propose to increase coach fares for passengers from 2 cents to 2.5 cents per mile. These increases, if granted, are estimated to bring \$507,000,000 additional revenues to the railways, of which \$48,500,000 will accrue from passenger traffic.

### Not a New Problem

The situation now confronting the railways is not new, except in its intensity. As long ago as April 18, 1935, the Interstate Commerce Commission authorized certain emergency surcharges on freight traffic which added \$120,000,000 a year to railway revenues, based on 1936 traffic, and which expired by limitation on December 31, 1936. Again on October 19, 1937, the commission authorized increases in rates on certain commodities that are estimated to bring \$47,500,000 in added revenues.

These measures, while helpful, have been entirely inadequate in meeting the rising costs of operation to which the railways are being subjected, especially within recent weeks and months. These added costs, which were set forth in part in the last issue, are estimated to aggregate

\$665,000,000. Their nature may be seen from the fact that since the low point of the depression, the prices which the railways have to pay for the materials they use have increased approximately 40 per cent, taxes have risen 25 per cent and wages have advanced approximately 18 per cent.

### Rates Will Still Be Low

In the face of these increases in costs, it is surprising to most people to learn that both freight and passenger rates have declined continuously since 1921 until they are now at the lowest levels in 16 years, and that after giving effect to the full increases requested by the railways the rates will be no higher than in 1929 and will still be nearly 20 per cent lower than in 1921. Let us look at a few figures.

In 1921, the first full year after the end of government operation, the railways received an average return of 1.275 cents per ton of freight handled one mile; in 1929, they received 1.076 cents; in 1936, they received 0.974 cents and in the first six months of 1937, this figure declined still further to 0.936 cents per ton-mile.

The extent of this decline is shown by a little analysis. For illustration, if the railways had received the same rate per ton-mile in 1936 as in 1921, their revenues would have been \$1,021,000,000 more than they actually were, this amount being slightly more than twice the total increase now requested. Furthermore, if the rates of 1921 had been continued in effect through 1936, the revenues of the railways through these 15 years would have been increased nearly \$13,000,000,000, an amount greater than the total funded debt of all the railways of the country. In the light of these figures, the increase which the railways are now asking is a modest one.

### A Large Public Interest

In any consideration of the railways, the public interest looms large. In a country such as ours with its vast distances, efficient transportation is a self-evident necessity. An efficient transportation system must be one with earnings sufficient to enable it to keep abreast of the times. Yet, there are today 96 railways, operating 71,386 miles of lines or 28.1 per cent of all the mileage of the United States, that are being operated by receivers or trustees under the direction of the courts because of inability to meet their financial obligations. This is the largest proportion of the country's railway mileage that has ever been in the hands of the court at one time—

and it will be increased materially unless the railways obtain substantial relief promptly.

Such a condition constitutes a menace to the more than 2,000,000 persons who have invested their savings in railway stocks and bonds. It is an equal, although less direct, menace to the vastly larger number of persons whose insurance policies and savings bank deposits are protected by investments in railway securities. To all these persons the restoration of the railways to a state of solvency is vital. This can be done only through materially increased revenues.

Aside from their interest to the investor, the railways possess a large public interest in their function as an employer and as a purchaser. Prior to 1929 the railways provided direct employment for 1,750,000 persons. During the depth of the depression, this total declined to 920,000. In July of this year it had again risen to 1,175,000. Surely an industry that is now providing employment for nearly 1,250,000 persons, and that is capable of adding thereto another 500,000, if given adequate earnings, possesses a large measure of public interest.

But this is only half the story. The railways are among the largest customers of industry and through their purchases, give rise to much additional employment. They purchase more than 70,000 different articles for routine use. In normal times they buy 23 per cent of all the bituminous coal mined, 19 per cent of all the fuel oil produced, 17 per cent of the country's output of steel, 20 per cent of all the lumber cut and hundreds of other materials in similar properties.

In the five years 1925-29, the railways spent an average of \$1,400,000,000 for materials and supplies, or an average of nearly \$4,500,000 per business day. In 1932-33, this average daily expenditure declined to \$1,500,000 per business day. The blow to general business that results from a decline in purchases of \$3,000,000 a day needs no elaboration. That the railways will convert increased earnings into enlarged purchases is evidenced by the increase of more than \$150,000,000 in their purchases during the first six months of 1937, coincident with an increase of \$60,000,000 in net railway operating income in the same period. No single measure will do more to set the wheels of industry in motion than the granting of the increase in rates.

### Efficient Service Paramount

Even more universal is the public interest in efficient railway service. It is anomalous that the railways are so suddenly confronted with so acute a crisis after they have made the greatest improvement in service in their history and at a time when their operations are establishing new high records for efficiency. In speed, dependability, safety and (for passengers) in comfort, railway service is attaining new high standards. Obviously this type of service is of the most direct concern to the public. Its continuance and its further improvement are essential to our national progress. Yet it is obvious that such service cannot be strengthened or long maintained without adequate earnings.

For all of these various reasons it is evident that the railways' application for increased rates possesses strong public interest, for it is only in this way that the railways can make their normal contribution to our national wel-

fare through the provision of adequate, ever-improving service, through regular employment, through normal purchases in the many channels of trade and industry, and through the protection of investors.

## The Future

### What May We Expect in Another 20 Years?

THERE are still some men in railway service who can recall the time when track gangs used the lever for lifting track; a larger number remember when ballast was unloaded from flat cars by means of a plow hauled by a cable attached to a locomotive. But it is doubtful if many track maintenance officers have any distinct recollection of the limited use made of power equipment as recently as 20 years ago.

Because it often happens that the initial effort to introduce a new appliance proves abortive and because there is sometimes a long interval between the first trial of a device and its general acceptance, it is usually not possible to fix any given date as marking the introduction of this or that equipment. However, because new products are usually not offered for sale until their merits have been proved, two means of comparing the status of power equipment today with what it was 20 years ago are readily available.

These are to be had in the list of the products shown at the Track Supply exhibit as reported in *Railway Engineering and Maintenance* for October and the advertising pages of the same issue, in comparison with like information obtained from the corresponding issue of 1917. To simplify this analysis the list of exhibitors and the list of advertisers were considered as supplementing each other, duplications being eliminated.

The October, 1917, issue lists three makers of track motor cars, one manufacturer each of tie tampers, a hand-operated rail crane, a steam ditcher and a gasoline engine, and two companies offering oxy-acetylene welding service or welding equipment. In addition, one firm exhibited an electric welder, but it was several years before this or any similar appliance was again offered for use on track. It does not follow that this list included all power appliances then in use in track maintenance, because the ballast spreader and air-dump cars were in regular service at that time. However, further additions would be few in number.

How does this list compare with the appliances exhibited or advertised in 1937? Any reader who desires can make the check for himself, but the significant feature of the progress made in the 20 years is that the present list includes many appliances not even dreamed of in 1917. True, the present list embraces seven companies offering welding service, appliances or materials, six different builders of power tampers, five makers of motor cars, and cranes in which gasoline or Diesel engines have replaced steam power, but the list is more comprehensive in the number of appliances for which no one had expressed a need 20 years ago.

To mention a few, there are tie adzers, spike pullers, spike drivers, power wrenches, power jacks, curve lubricators and snow melters. As stated above, arc and

flame welding service and appliances were being offered 20 years ago, but no one had thought of applying these processes to the heat treatment of rail ends, or the butt-welding of rails by these or any other process. Grinders were being used to a limited extent in 1917 for sharpening track tools, but at that time no track man would have understood why five manufacturers would some day be advertising or exhibiting grinding wheels or machines for use on rails, for in 1917 surface grinding and cross grinding of rails was an unheard of refinement. The crawler-type tractor was a prewar invention that attracted wide attention through its utilization in the "tanks" on the western front, but it was a far cry from that application to its use as "off-track" equipment in railway service.

What conclusion is to be reached from this review of the progress made in the mechanization of track maintenance during the last 20 years? The answer is that progress in the future is predictable only in part. It is possible to foresee the fruition of certain present trends, but in the light of past developments, it is certain that much of the progress in track design and maintenance in the future will involve the practical application of scientific discoveries that now appear to have only a remote relation to this field. If past experience offers any clue, it is certain that outstanding developments may be anticipated.

## Speed

### Watch the Sway Bracing on Curve Bridges

AMONG the most important elements in the preparations made by the railroads for the inauguration of faster trains has been the conduct of test runs for the purpose of determining the behavior of standard as well as light-weight equipment on both curve and tangent track. As a result of these tests a number of roads have carried out extensive programs of curve reduction and line revision, but of even greater significance are the conclusions reached concerning the relation of "comfortable" speed to superelevation and degree of curvature. Briefly, it has been found that with adjustments in the lengths of spirals and run-offs, greater accuracy in superelevation and uniformity in rate of curvature it is possible to operate trains around curves at greater speeds with entire comfort for the passenger than had previously been deemed possible.

These findings have been applied in the development of faster schedules for both passenger and freight trains, and with a high standard of track construction no difficulty has been encountered in holding curves in line in spite of the greater centrifugal forces imposed on them. However, the increase in the centrifugal force that may be realized is such as to indicate the need for an increase of as much as 75 per cent in the provision for these lateral forces in the design of new bridges located on curves, compared with current requirements of design specifications.

In view of this, it is not surprising that trouble is being experienced with the bracing of some of the older bridges located on curves on lines carrying high-speed

trains. Failures have occurred in gusset plates of sway bracing or in the connections of the bracing members to these plates. In most cases the expense involved in strengthening the cross bracing or even of installing new bracing of adequate capacity is not exorbitant, and the work involved is not of a particularly difficult nature. However, it is essential that bridges on curves carrying high-speed trains be watched closely to insure that evidence of overstress or incipient failure will be detected as soon as it takes place.

## Roadbed Drainage

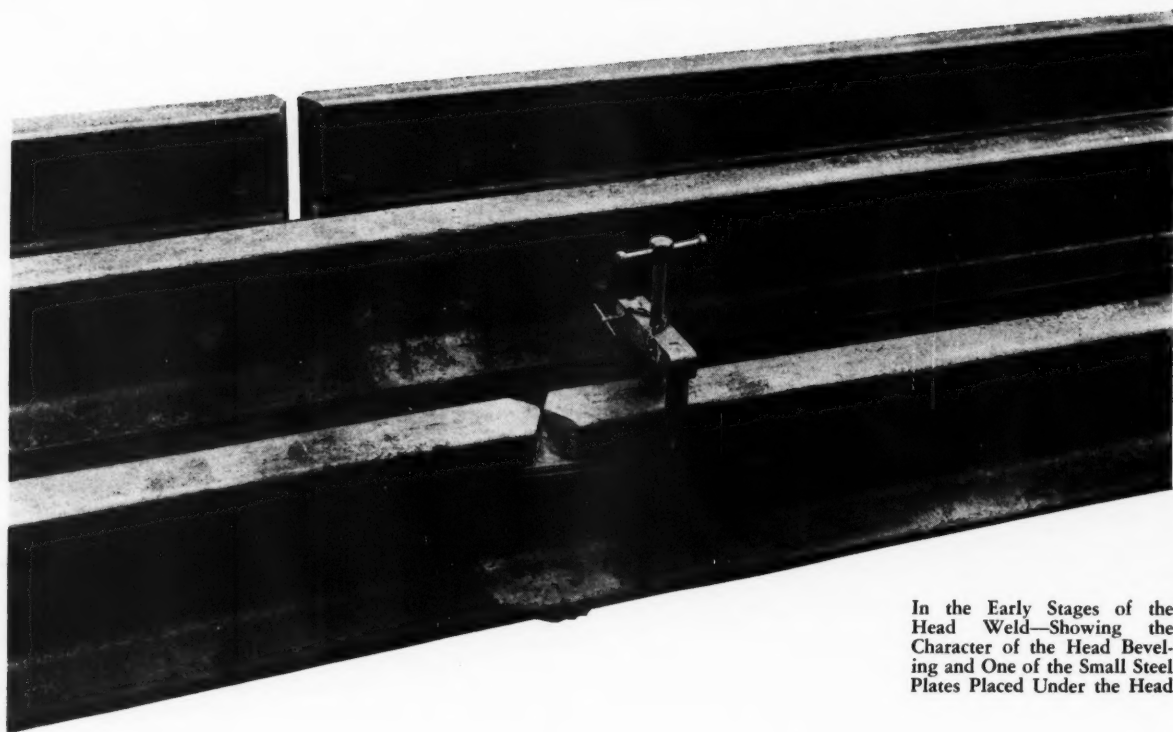
### A New Solution for an Old Problem

ROADBED drainage is a problem as old as the railways, although until recent years it was rarely given the consideration it deserved. In the early days, despite the recognition of the need for adequate subsoil drainage in cuts by a relatively few alert engineers, little was done about it.

As the standards of construction improved and the roadbed was widened to allow better ditches, it was assumed that these ditches would provide all of the drainage that was necessary and, in many cases, this proved to be true. The point of view from the earlier times persisted, however, on the part of construction engineers, that the maintenance of way officers would be in better position after the road was in operation to decide where subsoil drainage was needed. Often, however, the revenues from the new line were small for a considerable period, the consequence of this attitude being that the drainage work, if undertaken at all, was delayed, sometimes for years. As a result, more than a few maintenance officers have inherited roadbed conditions that have aroused considerable concern and often ingenuity has been taxed to the limit to correct them.

Where these conditions exist, various schemes have been developed for stabilizing the track, particularly where drainage is especially difficult or impracticable. These have sometimes taken the form of either a buried timber trestle or a concrete slab, the theory of the latter being that by spreading the load over a larger area and thus reducing the unit pressure on the soil, movement of the material in the roadbed will be eliminated. Furthermore, the slab acts as a barrier against settlement of the ballast into the roadbed.

Previous designs have been based on removal of the track and the casting of the slab in place. The most recent development, which was described in a paper presented at the recent convention of the Roadmasters Association by A. A. Miller, engineer maintenance of way, Missouri Pacific, and published in the October issue, calls for the use of precast slabs which can be placed without interfering with traffic. The results of the preliminary experiments were so satisfactory that the plan is being extended to other sections of the road. As a later development of the idea, similar grillages of timber are also being tested. While it is probably too early to say what the eventual results of these experiments will be, judging from the success of the cast-in-place slab they give promise of affording a much cheaper solution of an aggravating problem than any heretofore proposed.



In the Early Stages of the Head Weld—Showing the Character of the Head Beveling and One of the Small Steel Plates Placed Under the Head

## Uses Oxy-Acetylene Process to Butt-Weld Rails In Open Track\*

THE Central of Georgia has employed a new type of oxy-acetylene butt-weld in 2,184 lin. ft. of track, with 108 welds, which is the first installation of this type of weld that has been made in open track other than in station platform tracks. This installation is significant because it is the outgrowth of several years of rail welding by the oxy-acetylene method on the Central of Georgia, including the butt-welding of rails into continuous lengths in two tunnels, with resulting marked improvement in track conditions and doubling of the service life of the rail. Following a description of the latest installation of butt-welded rails in open track, reference will be made in some detail in this article to these tunnel installations, where the rails were first welded to-

gether in 1930, and then renewed with new continuous welded rails of a heavier section during the early part of the present year.

### Welded Alongside Track

The recent butt-welding of rails for installation in open track was carried out near Lovejoy, Ga., about 30 miles east of Atlanta, Ga., in the single-track main line between Macon and Atlanta. The work involved the joining of 39-ft., 112-lb. rails into two continuous lengths, each 2,184 ft. long, and then dragging these lengths, one at a time, directly over the ties of the running track for a distance of approximately one-half mile to the point of installation.

For the welding, a section of tangent track was chosen with sufficient width of shoulder to permit the lining up of the rails into continuous strings on blocking. This blocking consisted

of sawed ties, which were spaced at the center and near the ends of each 39-ft. rail. In setting up the rails, joints in the two lines were placed opposite, which made it possible to complete six welds with each setting of the oxygen and acetylene cylinders.

The new type of rail butt weld employed in the work, which was developed by the Oxweld Railroad Service Company, differs in a number of respects from the older types of oxy-acetylene rail welds designed by this company, and was the direct outgrowth of extensive research started several years ago by the Union Carbide and Carbon Research Laboratories, Inc., one of its associated companies. The fundamental differences between the new and older types of welds are largely in the details of making the welds, and in the fact that the new type welds are subjected to a slow cooling, or normalizing, treatment that is designed to remove

\*Adapted from a paper presented before the 38th annual convention of the International Acetylene Association at Birmingham, Ala., on November 10, by R. R. Cummins, assistant general manager of the Central of Georgia.

Following many years' experience in rail welding by the oxy-acetylene process, including both the building up of battered rail ends and the butt welding of rails together for installation in highway crossings and station platforms, the Central of Georgia, as early as 1930, laid continuous welded rails in two of its long tunnels. During the present year, it has relaid continuous welded rail in these same tunnels and has also made a test installation of long rails in open track, employing a new design of oxy-acetylene weld. These installations, together with the distinctive features of the new type of weld employed in them, are described in this article.

any abnormal stresses set up by the local application of the welding heat, and to improve the general quality of the rail metal through the weld area.

### Two Torches Used

Whereas the older type welds were usually made by a single welder, working on one side of the rail at a time, the new type welds are made by two welders working simultaneously on opposite sides of the rail. Beginning at opposite edges of the base, these welders carry their welds progressively across the base toward the web, always working from above. When the web is reached, these men carry the weld up the web, and then into and through the rail head. Thus, in the new type weld, the amounts of metal and of heat applied on opposite sides of the rail are constantly balanced.

To permit this balanced type of weld, the abutting rail ends are beveled with a cutting blowpipe in a manner different from the various practices used heretofore. In this, a sloping cut is made on the base of the rail on each side of the web, beginning about  $\frac{1}{4}$  in. back on the base and running out at the normal end of the rail. When facing rail ends so cut are brought together in proper alignment, a distinct "V" is formed at the junction of the bases, providing a working opening for the application of the weld metal.

Up the web and through the head, the rail is cut back on a double bevel both ways from the vertical axis through the web and head on the end of the rail, thus presenting a blunt

wedge shape in horizontal cross section. Abutting rail ends so cut form a double "V", one on each side of the rails, extending the full height of the web and the head, and thus provide equal and symmetrical areas for welding.

In the recent work on the Central of Georgia, all of this preparation of the rail ends was done in the field after the rails had been set up on the blocking alongside the track, using special metal templet to permit marking the correct lines of cuts. The preparation of each rail end for welding required approximately two minutes of one man's time.

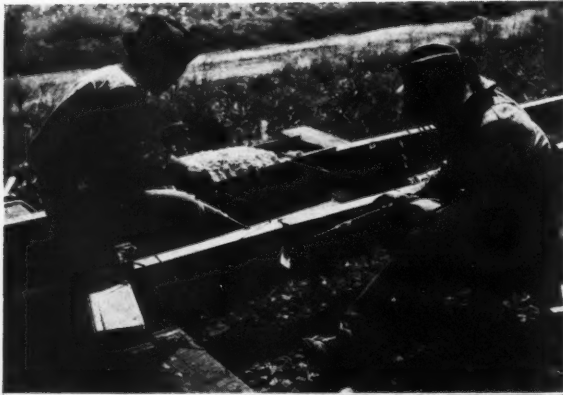
In making the welds, the first step was to clamp in place symmetrically beneath the "V"-cut base, a steel plate,  $5\frac{1}{2}$  in. long by 2 in. wide by  $\frac{3}{16}$  in. thick. This plate, of normal rail steel, was employed as a dam to prevent the flow of metal through the joint while making the base weld. The welding was then started and the weld was carried across the base simultaneously from both sides, and then up the web to the base of the head. Before continuing the weld into and through the rail head, a 1-in. by  $2\frac{1}{2}$ -in. by  $\frac{3}{16}$ -in. piece of rail-steel plate was placed beneath the ball of the rail head on each side, where, like the plate placed beneath the base, it functioned to prevent the flow of the weld metal outside the limits of the weld. The same type blowpipes were used in making the head weld, but the welding heads employed in the web weld were replaced by the slightly larger welding heads used

Completed Weld  
of Most Recent  
Oxweld Design



initially in the base weld. Each weld required approximately 50 min. to complete.

Immediately upon the completion of a weld, the entire section of the rail for a distance of approximately six inches each way from the weld was heated by means of two large-capacity blowpipes. This was done to taper the intensive weld heat out into each rail and thereby avoid a sharp demarcation of heat between the weld area and the normal rail steel. At the proper moment in this heat application, the torches were withdrawn, and the completed joint, for a distance of approximately 18 in. each side of the weld, was surrounded by ground asbestos packed into a sheet metal trough, and was then allowed to cool slowly for at least one hour. This slow cooling of the weld and the adjacent rail metal is said to have a normalizing effect upon the steel, giving improved qualities and added strength to the finished joint. The final operation in the joint welding was to dress up the running surface and both sides of the rail head



Starting the Base Weld, Working From Both Sides



Continuing the Weld Up the Web



Completing the Head Weld, With Operators Still Working Together

through the welded area, to produce the true rail-head contour. This was done with a flexible-shaft type grinder while the rails were still lined up alongside the track.

While the road has had no reason for concern about the soundness or strength of the welds made, it followed its practice of the past with butt-welded rails and applied bars to all of the joints as an added safety precaution. In this, second-hand 90-lb. bars were used, undersize bars being specified to avoid pinching the weld on the under side of the ball.

The location selected for the installation of the long rails was approximately one-half mile west of the point where the welding was done, and involved a section of stone-ballasted track, including approxi-

mately 440 ft. of tangent and approximately 1,745 ft. of two-degree curve. In transporting the long rails, each string was first lined over close to the running track, and was then dragged by a locomotive directly over the track ties to the point of installation. Here, the rail was lined into position on new 8-in. by 11½-in. double-shoulder tie plates with a 1 in 44 canted seat. The new plates were lagged to the ties by cut spikes, independent of the rail, and the rail was held in position by similar spikes adjacent to the rail base. No form of clamps or anti-creeper were used to anchor the long sections of rail in place against creepage or expansion and contraction, but for some distance beyond each end of the section of welded track, the normal anchorage

of the rail with anti-creeper was supplemented to the extent of providing a total of 8 to 10 anti-creeper per panel.

Immediately following the laying of the long rails, the track was given a light surface, with such tie renewals as were necessary, and was otherwise put in first-class condition. From careful records to be kept of the traffic over this section of track, the movement of the long rails with respect to permanent markers established, the amount of routine maintenance required, and the action of the joints themselves, the road expects to establish the merits of this type of track construction in meeting its particular requirements.

### Tunnel Rail Welding

This installation of butt welded rails is the outgrowth of experience on this road with rail welding that began in 1917 with the building up of battered rail ends and the butt welding of rails to eliminate joints in highway crossings and station platforms, and extending to the continuous butt welding of the rails in two of its long tunnels, first in 1930, and again in the spring of 1937. Of all of this welding, that in the two tunnels was the most unusual and interesting, and, therefore, will be referred to in some detail.

The tunnels involved were the Coosa Mountain and Oak Mountain tunnels about 21 miles east of Birmingham, Ala. Both tunnels are single-track, the former being 2,431 ft. long, and the latter 1,198 ft. long. Both tunnels presented difficult problems in maintaining good track, and the life of the rail, in particular, was seriously limited. With restricted overhead and side clearances in both tunnels, and rock floors, only a limited amount of ballast was possible under the track ties, and this, coupled with constant dampness from roof drip and the severe corrosive action of locomotive gases on the rail fastenings, resulted in low joints and severe rail batter, regardless of the efforts of the track forces. As a result, the service life of the rail and fastenings in these tunnels was limited to about three years, and the riding quality of the track was never comparable with that of track in the open.

In an attempt to improve these conditions, new 90-lb. rail was laid in both tunnels in 1930, the rail being butt-welded outside into lengths of 429 ft., and then pulled into the tunnels by a locomotive, where the separate sections were joined by oxy-acetylene welds into continuous lengths. The welds employed throughout were the latest Oxweld design

at the time. In order to derive the value of the continuous rails without concern for the safety of the track, all of the welded joints in both tunnel installations were fitted with second-hand 100 per cent, four-hole, 90-lb. joint bars, fully bolted.

Tests showed that the range of temperature within the tunnels was limited to 73 deg. F., so that no trouble was anticipated with expansion and contraction of the long rails. However,  $\frac{1}{4}$  in. was allowed for expansion at the first joint at the ends of each welded section, but this proved unnecessary since there was no perceptible movement of the rails.

### Method of Welding

The only work on these rails prior to butt welding them was to "V" their ends. In this earlier work, using a cutting torch, the web and flanges of the rail base were so beveled as to form a distinct "V" at the junction of the webs and base flanges of abutting rails. The rail head, on the other hand, was beveled downward from a point about  $\frac{1}{4}$  in. back from the end of the rail, except for a vertical rib left in the center to facilitate the starting of the head weld.

The welding was begun at the base of the abutting webs, with the rails tight together so that the temperature of both could be maintained as nearly uniform as possible during the welding operations. From the center of the base, the weld was extended outward on each side, completing the base weld, and was then carried up the web and half-way through the head. Using a different rod, the remainder of the head weld was then made, the top surface being completed last.

While completing the head weld, the weld metal at the running surface was constantly peened as applied, using a  $2\frac{1}{2}$ -lb. machinist's hammer. The final smoothing and finishing of the top of the weld was accomplished by holding a 3-lb. flatter on the weld surface and striking it repeatedly with an 8-lb. hammer. After thus completing a weld, all excess material on the fishing surfaces of the head, and on the web and base, was removed with a blowpipe to permit a snug fit of the angle bars that were applied.

All of the welding was done by two crews, each consisting of an experienced welder and an assistant. Each crew completed an average of 3.29 welds in an 8-hr. day. After the welded strings of rails had been pulled into the tunnels, they were allowed to stand for about 24 hr. before being laid in the track, to permit their assuming the normal temperature of the tunnels.

Prior to moving the rails into the tunnels, the track in each tunnel was carefully overhauled, making all tie renewals necessary and correcting all irregularities in line and surface, although no ditching or ballasting was done. In an attempt to retard corrosion of the new rail and fastenings, all of the exposed steel of the track structure, except the running surface of the rail head, was painted with a preservative coating, a practice which was continued each year thereafter.

### Second Welding in Tunnels

After six and one-half years' service of the welded rail in the two tunnels, which was more than double the life formerly obtained from rail with the usual type of joint construction, it became necessary to renew the welded rail, owing to the loss in section as the result of corrosion, which, in some instances, was as much as 30 per cent. At this time, proceeding on the assumption that longer life could be obtained from heavier rail, it was decided to use rail of 112-lb. section in the renewal work, welding it into continuous stretches, as before. It was also decided to overhaul the tunnel tracks completely, cleaning out the side ditches, renewing all ballast, and replacing the crossties out-of-face. This phase of the work was started in the Coosa Mountain tunnel

on March 15 of the present year. The material removed was loaded on push cars equipped with standard ditching dumps, which were hauled to the dumping ground by heavy-duty track motor cars.

### Latest Design Weld Used

The butt welding was begun on March 22, and was carried out at a convenient location on tangent track outside the tunnel. This type of weld employed, and the specific method of making the welds, were similar in practically every respect to those used near Lovejoy. In fact, the tunnel installations represented the first large-scale use of the latest Oxweld type of weld and had a bearing upon the decision to employ the same type of weld in the subsequent installation in open track. The most important difference in the method employed in the tunnel was that while making the base weld, standard rail joint bars, suitably cut away at the center of the base to permit making the full base weld on both sides, were applied temporarily to the rails to insure that their ends were in true alignment and surface. The use of these bars was dispensed with in the later work near Lovejoy, where conditions were such that there was no difficulty in lining up the rails accurately without the

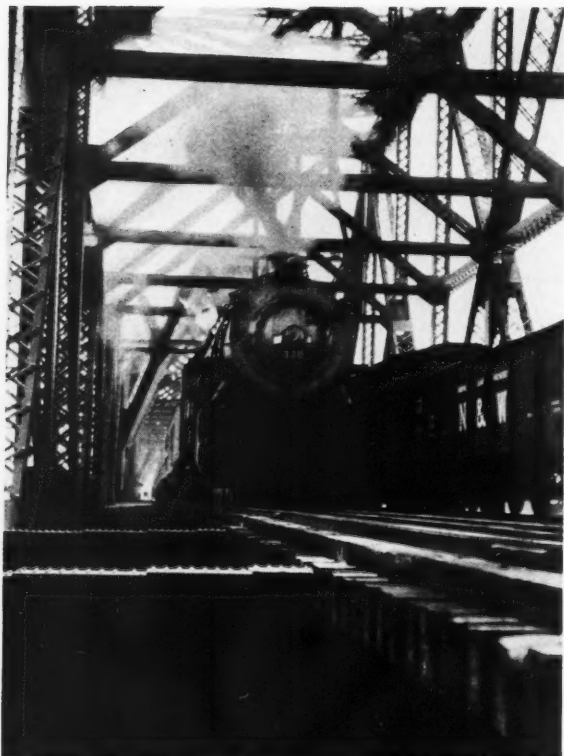
(Continued on page 904)

First Step in Stress-Relieving Operation—Raising Temperature of Weld and Adjacent Rail With Large-Capacity Torches



Completed Weld Is Surrounded by Ground Asbestos to Complete Slow-Cooling, Stress-Relieving Operation





## Wrought Iron Against

**Troubled with severe brine-drip corrosion of the top angles of the deck stringers of its long bridge over the Ohio river at Kenova, W. Va., the Norfolk & Western has welded wrought iron cover plates to the tops of all of the stringers affected, stopping further corrosion and stiffening the top flanges at the same time. This work, which involved 3,381 lin. ft. of plates and 6,762 lin. ft. of fillet welds, and which was done without delays to traffic, is described in this article.**

CONFRONTED with the problem of serious brine-drip corrosion of the top flanges of the deck stringers on the eastbound side of its large double-track bridge over the Ohio river at Kenova, W. Va., the Norfolk & Western recently overcame this problem by welding continuous genuine wrought iron cover plates

on the tops of the stringers. Altogether, 3,381 lin. ft. of plates were added to the floor system, involving 6,762 lin. ft. of fillet welds.

### Lacked Lateral Stiffness

The plates added were not required to strengthen the floor system against longitudinal bending in a vertical plane, since there was still more than adequate section in the stringer flanges to take care of such bending stresses, but rather, were provided to restore the lateral stiffness of the floor members, and to strengthen and to protect against further corrosion the top flange angles of the stringers, which, on the inside, had bent downward under the deflection of the track ties.

All of the work involved was done under heavy traffic, without delay to a single train, and, as a result of the repairs made, it is expected that costly stringer or flange angle re-

newals, with the detouring of trains that would be necessary, will be postponed indefinitely.

The Norfolk & Western's bridge over the Ohio, built in 1911 to replace a lighter structure in the same location, involves a 518-ft. channel span and four 298-ft. flanking river spans, two at each end. The bridge proper, which affords a clearance of 100 ft. above low water, has a 60-ft. approach viaduct on a curve at the west end, while on the east end it is approached by a structural steel viaduct 2,210 ft. long, making a total length of the crossing approximately 4,000 ft. All of the river spans consist of through Warren trusses with subdivided panels, while the approach viaducts are of deck girder construction on steel tower supports.

The floor systems of the different river spans consist essentially of built-up floor beams at intervals of 30 to 32½ ft., supporting four lines of built-up stringers, two, of which



Center—All Repair Work on the Stringers Was Done from the Bridge Deck, Without Interfering with Traffic. Right and Left—Two Views of the Bridge

## into the Rescue

spaced  $6\frac{1}{2}$  ft. apart, carry each track. The stringers, braced laterally because of their length, had 6-in. by 6-in. by  $\frac{1}{2}$ -in. top flange angles, without cover plates, and directly supported the track ties which were suitably dapped to hold them in alinement.

### Corrosion Heavy

Having been kept well painted, the bridge as a whole is in good condition and will serve the road adequately for many years to come. The major problem in maintaining it was to protect the top flanges of the floor stringers beneath the eastward track against brine-drip corrosion, the preponderance of loaded refrigerator car movement being over this track. As a matter of fact, there was practically no brine-drip corrosion of the stringers carrying the westward track. Even the corrosion of the stringer angles beneath the eastward track had not

extended to the point of weakening the members appreciably, but it was evident that unless some form of positive protection was employed against the further inroads of corrosion, it would soon become necessary to renew most of the top flange angles.

The plates used were  $\frac{5}{8}$  in. thick and generally 11 in. wide, this width allowing the necessary exposure of the edges of the angles to permit downhand fillet welding of the plates to the angles along the edges. On the most westerly span of the bridge, where the corrosion of the edges of the angles was the most severe owing to the superelevation in the track of the approach curve, which caused excessive discharge of brine-drip from cars, 10-in. plates were used. These narrower plates were necessary to afford adequate width along the corroded edges of the angles to permit sound, full-section welds.

Since the lateral bracing of the

long stringers brought many connection rivets in the stringer angles, it was necessary to have all the protection plates shop-punched so that they would lay flat on the stringers and so that they could be slipped into place readily without a lot of field drilling or burning. This was done without difficulty from the drawings of the bridge as built, and all of the plates fitted without field alteration. In connection with this work, most of the lateral bracing connections were renewed, including in all cases the rivets holding the connection plates to the stringer angles. This work was done ahead of the welding, so that it did not interfere with the latter work in any way.

### Preparatory Work

In carrying out the cover plate work, two separate groups of men were employed, a bridge force and the welders. In the first step, the rivets of all lateral connections to the top flange angles were cut out and the connections were bolted temporarily. The tops of the angles were then cleaned of rust and paint with pneumatic scaling tools. Following this, and treating each stringer panel separately, the track was jacked up and the cover plates on opposite stringers were slid into position. As this work progressed, the old lateral bracing connection plates were removed and new plates were bolted in place; then, immediately ahead of the welding, the edges of the flange angles and of the new cover plates were sand blasted. All of this work was done between trains without any delays to traffic.

The first step in the welding work was to remove the guard timbers to permit the bunching of the ties and thus afford working space for carrying out the welding. The shifting of the ties was limited to the extent of exposing two feet of the stringers at a time. This afforded ample room for the welding operations, while at the same time it permitted uninterrupted train movements over the track without the necessity for respacing the ties for each train. The next step in the work was to draw up tight to the

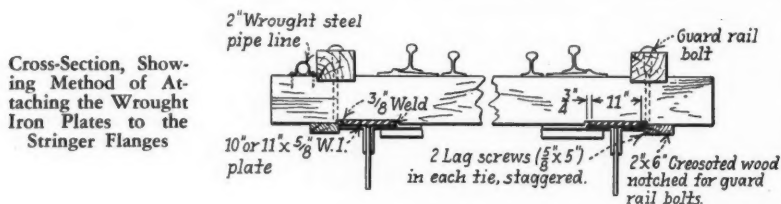
new cover plates the outstanding legs of the flange angles, which had been bent down in service. This was done by means of four heavy "C" clamps, two of which were spaced six inches apart on each side of the stringer, and which were moved ahead as the welding progressed.

### Only Two Welders

All the welding was done by two welders, one assigned to each stringer. Working abreast of each other, while seated on the ties and welding downward, each man welded both edges of his cover plate. In all this work, 3/16-in.

then painted, employing spray guns.

Two 300-ampere gasoline-engine-driven welding machines were employed in the welding work, each equipped with 600 ft. of cable, so that only two locations of the machines were required to complete the work over the entire bridge. The locations chosen were the opposite ends of the piers of the central river span, where the machines were blocked up on timber cribs. Compressed air for all of the bridge cleaning, riveting and spray painting involved in the work was furnished by a 150-cu. ft. stationary-type, motor-driven compressor located at one end of the bridge. This unit supplied air continuously across the structure



bare steel electrodes were used, employing a low welding current in order not to burn through the thin edges of the badly corroded angles. All of the welds were 3/8-in. fillet welds, and were made continuous, in spite of the fact that it had been determined that intermittent fillet welds would have produced the necessary strength. This was done to seal the edge lines of contact between the angles and plates to prevent the entrance of moisture.

After each two-foot length of cover plate had been welded on both stringers, the ties were shifted to expose the next two feet, and the drawing up of the angle legs and the welding proceeded. When a train approached on the track being worked, the welders merely stepped out of the way, resuming work as soon as it had passed. During the cover-plate welding, as the ties were respaced, 2-in. by 2-in. anti-creeper angles, 10 in. long, were welded to the tops of the new cover plates. At the same time, where tight rivets in the floor beams were found with undersize heads due to corrosion, the old heads were cleaned and then built-up to full section by welding. Many of these rivets gripped several pieces, and much time was saved in building up their heads instead of redriving them. As the welding work was completed over a section of the bridge, the lateral bracing connection plates were riveted, replacing the temporary bolting, and the cover plates and angles were

through a permanent 2-in. wrought steel pipe line, with gate-valve-controlled outlets at intervals of 150 ft.

The bridge force engaged in the stringer repair work included an average of 10 men, who cut out rivets, cleaned the stringers, installed the new cover and connection plates, and did all painting. The welding force consisted of two welders and three helpers, the helpers being employed to space the ties, place and move the "C" clamps, and to assist the welders in any other way required.

Altogether, 112 cover plates were installed on the bridge, these requiring 6,762 lin. ft. of fillet welds. The average production of the two welders together was approximately 120 lin. ft. of weld daily. The average cost of the welding work exclusively, including the cost of labor, electrodes, gasoline and oil, but not interest on and depreciation of equipment, was approximately 30 cents per lineal foot of weld, a figure which was affected adversely by the repeated delays to the work caused by heavy traffic over the bridge.

The repair work described was carried out by the regular bridge and welding forces of the Norfolk & Western under the general direction of W. P. Wiltsee, chief engineer, and A. B. Stone, bridge engineer, and under the immediate direction of R. P. Winton, welding engineer, to whom we are indebted for many of the details contained in this article. All of the genuine wrought iron cover plates were furnished by the A. M. Byers Company, Pittsburgh, Pa.

## Buckled Track Derails Train

WHEN the track on which his gang was renewing ties buckled, a section foreman on the Grand Trunk Western at Ionia, Mich., ran back to flag a passenger train that was then due, but although his signal was acknowledged at a distance of 1,445 ft. from the defect in the track, an emergency brake application failed to stop the train short of the kink, and three employees were injured in the resulting derailment, one of them fatally.

According to the testimony of the foreman, as reported by the Bureau of Safety of the Interstate Commerce Commission, the gang had renewed ties on the morning of the day that the accident occurred. The work was done in conjunction with a surface lift of 7/8 in. but he did not consider that this called for flag protection. Immediately after lunch, while the gang was tamping and spiking the ties, he noticed a slight kink, and when his men attempted to line this out, the track suddenly jumped from 8 to 10 in. out of line, forming a letter "S."

The track was laid with 90-lb. rail on hardwood ties, fully tie plated, equipped with rail anchors and ballasted with washed gravel; it was well maintained. According to thermometer readings taken at Ionia on May 3, temperatures on the day of the accident were moderate. It was 60 deg. F. at 9 a.m., and 75 deg. at 1 p.m., for which reason, according to the report, it could not be stated definitely what caused the kink.

## Block Used as Seat Causes Derailment

ON August 9 a freight train on the Lehigh Valley was derailed near Vixit Junction, Pa., and subsequent investigation led to the conclusion that the accident had been caused by a block of wood 2 1/2 in. thick that had been lying on the outside rail on the curve at that point. The derailment resulted in the death of two members of the crew and the injury of a third.

The accident occurred a few feet from a highway grade crossing, and according to the report of the Bureau of Safety of the Interstate Commerce Commission, two bus drivers testified that they frequently stopped at this crossing to pick up passengers. On numerous occasions, they said,

they had observed passengers sitting on blocks of wood placed on top of the rails. It could not be proved that the block that caused the derailment had been placed on the rail for this

purpose, but the drivers stated that at various times they had seen these passengers get up and start for the bus and then go back and push off the rail the block they had sat on.

## Use Crane and Fresno to Widen Embankments

A RAIL crane equipped with a fresno and operated as a drag line, has proved an effective and economical means of widening roadbeds on the Atchison, Topeka & Santa Fe in Western Kansas. The object of this bank widening is to make good the loss of width resulting from erosion or any other cause, but which has been brought about primarily by winds. The loss from this cause has been particularly severe in the drought-affected areas that have suffered from dust storms during the last three years.

### Used on Main and Branch Lines

The method has been applied to both main lines and branch lines. On the former, between five and six miles of roadbed that had been reduced to a crown width of only 14 or 15 ft. were restored to the original width of 20 ft. in preparation for a resurfacing program. On branch lines roadbeds have been similarly treated, except that the conditions to be cor-

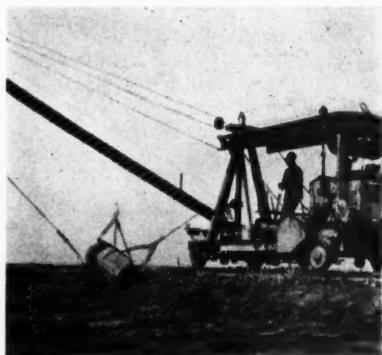
rected were more severe. In some places the crown width had been reduced to but 8 or 10 ft., and in a few locations the loss was so great that soil was blown from under the ends of the ties. Roadbeds on about five miles of branch line have been restored to a width of 18 ft. by this method, and it is planned to apply the process to an additional mileage.

As seen in the illustrations, the equipment used is a Burro crane with a swinging boom. This crane is provided with hoisting equipment to

handle a clamshell bucket, and the holdback drum is used for the drag cable. The operation is simple, for the boom, which is swung at right angles to the track, has sufficient reach to permit the fresno to be dropped beyond the toe of the embankment where it picks up a load of soil and is then drawn up the slope of the fill for dumping. In addition to the crane operator, the force includes four men—two men to guide the fresno as it is being loaded and two to level off the dirt as it is dumped. This force is also employed to construct cribs at intervals along the roadway on which the crane may be set off to clear trains. These cribs are constructed in advance to avoid delays.

### Proved Economical

This method of widening roadbeds has proved very economical, especially on branch lines where traffic interference is at a minimum. It has been employed on embankments as high as 20 ft. We are indebted for the information presented above to R. G. Whyman, division engineer of the Western division, Atchison, Topeka & Santa Fe, Dodge City, Kan.



Three Views Illustrating the Methods Employed in Using the Crane and Fresno



## Straightens Both Line and Surface-Bent Rails

FOR SOME time the Gulf, Mobile & Northern has been using a machine of its own design for taking surface kinks out of rails without removing them from the track, one of the features of which is that it is built of scrap materials, except the jack. The device consists essentially of a bridge or beam, a fulcrum, a jack, a shackle and a pair of double-flanged wheels. The bridge is formed out of two 90-lb. scrap rails, each 5 ft. long, having their heads joined by spot welding, with stays welded between the bases. A steel block, 2-in. by 2-in. by 5-in., is welded to the bottom at each end.

A frame, containing a discarded car spring, and carried on double-flanged wheels formed from old car axles, is fastened to the bridge and is fixed in such a way that the end blocks clear the track rail about  $\frac{1}{4}$  in. When actually engaged in straightening a surface kink, the pressure of the jack against the fulcrum and shackle compresses the springs enough to bring the end blocks to a bearing on the top of the rail.

A fulcrum, consisting of a 3-in. by 3-in. by 12-in. vertical steel block, slightly rounded at the top, and a brace are welded to the top of the bridge a little to one side of the cen-

ter. To act as a lever, one end of a 3-in. by 3-in. by 24-in. steel bar is attached, in the plane of the bridge, to the upright fulcrum by means of two straps and two bolts which act as a hinge. When in use they hold the lever in position so that one end rests on the rounded upper end of the fulcrum. Resting on top of the lever

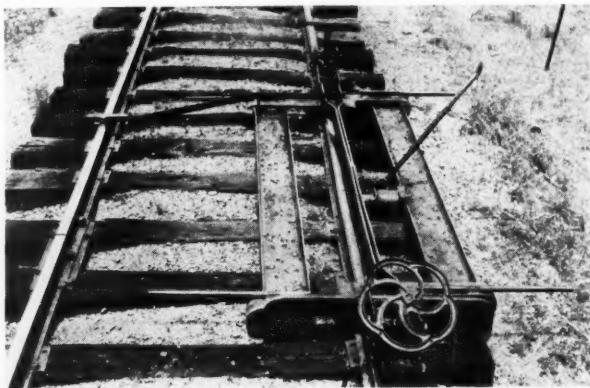
bar and with its axis at right angles to the bar is a short section of a pin from an old pin-connected bridge. Plates of larger diameter are welded to each end of the pin to act as guards.

At each end of the pin, not connected to it, inside these plates but clearing the bridge on either side, are two links made from 1½-in. truss bars, which form the shackle. The center of the pin, and of the links, is about 6 in. from the fulcrum. The bottoms of these links extend below the base of rail, where they fit around a 3-in. pin which is slipped

Between the jack and the end of the bridge, and transverse to it, a 1-in. rod with its ends elevated slightly is welded to the bridge to act as a carrier for the links when the machine is being moved. Completing the assembly, an outrigger arm having a flangeless wheel which rests on the opposite rail, gives stability against overturning and facilitates movement of the machine along the track.

### How It Works

In operation, an experienced trackman precedes the machine, equipped with a long steel straight edge and a taper gage. The latter has lines



A Separate Machine Is Used for Taking out Line Kinks

are two links made from 1½-in. truss bars, which form the shackle. The center of the pin, and of the links, is about 6 in. from the fulcrum. The bottoms of these links extend below the base of rail, where they fit around a 3-in. pin which is slipped

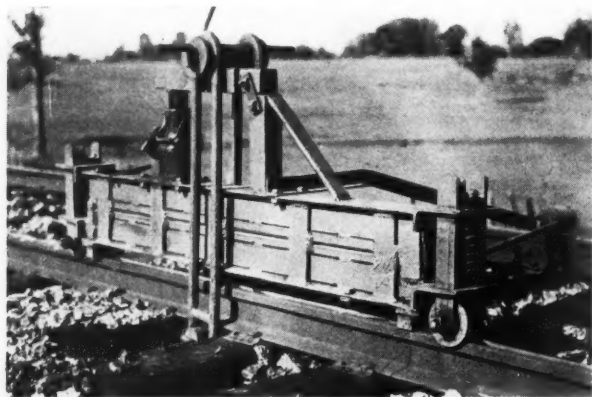
across the wedged face, which are numbered 1, 2, 3, etc. The straight edge is laid along the top of the rails and the gage is inserted between it and the rail at the point of greatest deflection. The line to which the gage fits is then noted and the corresponding number is marked on the rail at the point where the kink occurs.

An investigation made to determine the distance that the rail springs back after it is pulled up with the machine showed that this distance is constant for any given section of rail and length of span. Accordingly a set of steel blocks 2 in. wide and 2 in. long, but of varying thicknesses, was made up and numbered to correspond with the numbering of the lines on the gage.

### Setting the Machine

When the machine is set over the surface kink that is to be straightened, the pin is placed under the rail, the links are slipped over it and a block of the required thickness, as indicated by the numbering, is set on the rail. The jack is then raised until the rail is brought solidly against the block, when it is released and the machine is moved to the next point.

It is said that it requires, on the



The Machine for Taking out Surface Kinks Set up Ready to Straighten a Rail

ter. To act as a lever, one end of a 3-in. by 3-in. by 24-in. steel bar is attached, in the plane of the bridge, to the upright fulcrum by means of two straps and two bolts which act as a hinge. When in use they hold the lever in position so that one end rests on the rounded upper end of the fulcrum. Resting on top of the lever

under the rail when a kink is to be straightened, and removed when the straightening is completed. To facilitate this operation, the pin is fitted with 1-in. projections at each end which act as handles.

Directly under the lever and about 18 in. from the fulcrum, a jack rests upon and is bolted to the bridge.

average, only three minutes to straighten a surface kink, or at the rate of 20 kinks an hour. It is also said that only one man is required to operate the jack for the straightening operation, although several additional men are needed for incidental reasons.

### Straightens Line Bends

In addition, this road is using a separate machine for straightening line bends in rails without removing them from the track, the general design of which is shown in the second illustration. This machine, like the one just described, is also made from scrap materials. At each end is a truck consisting of a frame and a double-flanged wheel, similar to those already described. This truck carries a heavy transverse bar to which are welded two I-beams, one for each side of the rail, each of which is composed up of two 9-in. channels welded together in the back-to-back position.

A heavy strap is hooked over the beams and welded at each end of the beams. A second set of similar hooks is loose, fitting over the rail and either beam as desired, along which they can be slid at will. A 25-ton jack, with a hook on its base so that it can be slid back and forth, is interposed between the rail and beam to do the straightening. As the machine is symmetrical, the jack can be placed either inside or outside the rail as demanded.

When a rail is to be straightened, both lines of spikes must be pulled within the limit of the bend, and the rail must be gaged and respiked after

it has been straightened. When the spikes have been pulled the machine is set so that the center of the beams is about opposite the kink, and is shifted to the right or left to facilitate the setting of the jack. After the jack has been placed with its top against the web of the rail and its base against the beam, the hooks are slid to the proper position and the jack is operated until the bend is out of the rail. An outrigger to

keep the machine in balance completes the assembly.

It is said that with a sufficient force to pull spikes and regage the rail, 200 bends can be straightened in eight hours of actual working time, or at the rate of 25 an hour. The operation of the machine requires the services of two men and a foreman, but the latter is also able to supervise the force required to pull the spikes and respike the rail.

## Water Service Repair Men Use Trucks on the Rock Island

WATER Service mechanics on eight divisions of the Chicago, Rock Island & Pacific carry on much of their work with the aid of motor trucks, thereby avoiding loss of time in waiting for trains and enjoying the advantage of a convenient means of transporting their tools and equipment, and supplies of lighter materials and repair parts used in their work. Following experimental use of trucks on two divisions, eight additional units were purchased in the fall of 1936, and observations of the operation of these trucks for a period of about a year have demonstrated marked economies for the new mode of transportation. Proposals to supply trucks for the water service men on the other two divisions are under consideration.

Most of the trucks now in use are of the one-half ton, pick-up type with enclosed cabs, equipped for cold weather. They are equipped with four-speed transmissions, to permit of their use in lieu of a power hoist for such purposes as pulling wells.

Owing to the wide variations in the mileage and other physical conditions in the territories served, the operations differ to some extent on the several divisions. The average number of trips made per month per truck ranges from as few as 8 to as many as 27. The average round trip on the different divisions ranges from 50 miles to 150 miles and the longest trip varies from 115 miles to 353 miles.

On five divisions the territory to be covered is such that the repair man can drive from headquarters to most of the water stations and return the same day. On one of these divisions, only three stations are so far away as to require the men to stay out over night, while on the other three not more than three to five overnight trips are required per month. On the other four divisions the distances are so great that from 25 to 75 per cent of the trips are of more than one day's duration, suitable adjustments in compensation being made in lieu of expense allowances.

### Men Carried

The number of men carried on the truck also varies with local conditions. Thus, on each of two divisions practically all work is done by one man. On another there are two men on the truck about 75 per cent of the time, and on the five remaining divisions two men are regularly assigned to the truck, although on one of them this



One of the Light Trucks Used by the Water Supply Repair Forces on the Rock Island

force is increased at times to three or four men.

While the use of the trucks has been of large benefit in saving the time of the men in traveling to and from their work, it has also proved advantageous in transporting tools and supplies, not only because it removes the limitations as to weight and bulk imposed on men riding passenger trains, but also because it solves the problem of transportation between the passenger station and the water station. On one division, also, the truck is used regularly to carry oil and other supplies to pumping plants located several miles from stations.

#### Haul Lighter Tools

In general, however, these trucks are not used to carry heavy loads of materials. The primary purpose is to carry the lighter tools—pipe dies and bolt dies, a hand tool kit of wrenches, chisels, etc., a pick and a shovel, calking tools, and, when needed, the wrenches and other tools, rope and tackle for handling heavy pipe. Occasionally a gas-welding outfit is carried as well, but the policy of the forces using the truck is to avoid loading it down with equipment not needed on the trip.

In addition to tools, the truck invariably carries a supply of fittings and nipples for  $\frac{3}{4}$ -in. and 2-in. pipe, as well as short lengths of these sizes of pipe, and valve and pump packing. It is also the usual practice to carry along stop and waste cocks and repair parts for toilet fixtures, lavatories, water cranes, etc.

Reports prepared by the various divisions demonstrate clearly that the use of the trucks has been a source of appreciable economies. Perhaps the greatest saving has been brought about by eliminating the loss of time incurred by the men in waiting for trains. The men are able to devote a much greater portion of their time to productive work.

#### Other Uses

The trucks have also been used to advantage in a variety of incidental ways. With the aid of a gin pole and  $\frac{3}{8}$ -in. cable tackle, a truck has supplied the power for unloading heavy pipe from a gondola car. The trucks have also been a means of saving time in emergencies—the men get on the ground in much shorter time, and while it is the general rule to ship heavy materials by train, the trucks have come in handy on various occasions in delivering large fittings or other special items needed on short notice. One division also reports the use of the water service truck by the

mechanical department in meeting an emergency created by an engine failure on the line.

The use of these trucks is one of many innovations that have been initiated by the water service department of the Rock Island.

### Derailment Ascribed to Short Flagging

THE derailment of a freight train on the Baltimore & Ohio near Cannelburg, Ind., on August 24 was ascribed by the Bureau of Safety of the Interstate Commerce Commission to the failure to provide adequate flag protection when a rail was temporarily removed from the track. The accident resulted in the death of one trackman and a trespasser and injuries to the engine crew, head brakeman and three members of the track gang.

Flagmen were sent out as the joint bolts were being removed and when the flagman involved in the accident saw the train approaching he ran toward it about two rail lengths and after applying two torpedoes, he ran in the reverse direction about the same distance before he gave a stop signal with his flag, at which time he was about 1,150 ft. from the place where the rail had been removed.

The engineman said that he had seen the flagman for some time before he waved the flag, as the track is on a long tangent, but did not realize that the flagman was trying to stop the train until the signal was given. As a result the speed of the train, which was about 45 m.p.h. when he saw the signal, was reduced only to about 20 m.p.h. when the derailment occurred. The flagman said that he had never been examined in flagging rules, but that he had once been told that he should give the flag signal at a point somewhat farther from the approaching train than the place where he had applied

the torpedoes. Testimony concerning the time allowed the flagmen before the rail was removed was somewhat conflicting. The foreman said he waited until they were out a "sufficient distance." The flagman said he had been walking from 5 to 8 min., when he first saw the train, but three days after the accident in reenacting his movements, he walked the distance in 4 min. and 45 sec.

### Butt-Weld Rail by Gas on Open Track

(Continued from page 897)

use of the bars. However, as in the later work, small second-hand angle bars were applied to the finished joints.

The rails for installation in the Coosa Mountain tunnel were welded into two continuous lengths of approximately one-half the length of the tunnel, and these strings were pulled into the tunnel, one at a time, by a locomotive, necessitating the making of only two butt welds within the tunnel. The long welded sections were first laid on the old crossties, replacing the released rail, and then all of the crossties were renewed out-of-face. To insure minimum interruption of the work by train movements, all of the track work was done at night. However, in the interest of economy and early completion of the work, a second gang was employed during the day to clean up and to carry in materials for the night gang. In connection with the laying of the welded rail, all tie plates, and the body of the rail itself, were coated with a preservative coating.

Immediately following the completion of the work in the Coosa Mountain tunnel, the renewal of the rail and overhauling of the track in the Oak Mountain tunnel were undertaken. In this later work, the welding of the rails, and all phases of the track work were carried out in the same manner as in the Coosa Mountain tunnel, with the single exception that because of the shorter length of the Oak Mountain tunnel, the welded stretches of rail, as prepared outside of the tunnel, were made sufficiently long to extend completely through the tunnel.

All of the rail butt welding on the Central of Georgia has been carried out by company forces, under the direction of R. R. Cummins, assistant general manager, and W. R. Golsan, Div. Engr., with the assistance of representatives of the Oxweld Railroad Service Company.



Winter on the Grand Trunk Western

# Electric Switch Lamps Used on Santa Fe

**Battery operation proves advantageous if approach lighting can be employed to avoid needless current consumption**

ON THE Atchison, Topeka & Santa Fe, switch lamps have been lighted electrically for many years in territories where alternating current power distribution lines supply energy for the automatic block signals. However, during the last 10 years electric switch lighting installations have also been made with current from primary batteries on a sufficient scale to indicate its practicability and economy in locations where power distribution lines are not available, providing certain requisites are satisfied. Some 150 main line switch lamps are now operated from batteries on the 202 miles of line between Dodge City, Kan., and La Junta, Colo., which is equipped with primary battery automatic signaling. Similar installations have been made on shorter stretches of the same type of signaling on the Southern Kansas and Oklahoma divisions.

Electrically lighted switch lamps

are normally equipped with 3.5-volt 0.3-ampere lamps, and where the lights are operated on central station current, they usually burn continuously. However, in most cases this is not economically feasible when using battery current, as these lamps will exhaust a 500-ampere-hour battery in about 1,660 hours, or 70 days. Consequently electric switch lamps on battery current are normally used in connection with an approach lighting scheme so that the lamp burns only during the time that a train is in the approach track circuit.

## A Sunlight Relay

As approach circuits would be prohibitive in cost unless the line is track circuited for automatic block signals, another alternative sometimes employed is to install a sunlight relay that cuts out the lamp during daylight hours. Still another expedient



Switch Lamp Equipped for Electric Lighting  
—Indicator Shown with Cover Removed

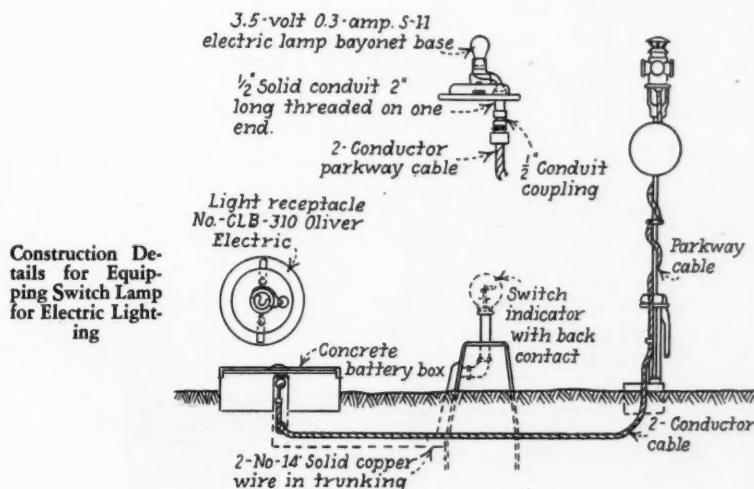
is to use a smaller lamp, namely, 3.5-volt 0.120-amperes, and while this involves a reduction in the intensity of the light to a point that requires careful focusing to insure that the filament is accurately centered with respect to the roundels, these low-power lamps have proved entirely practical in some installations.

## Use Existing Oil Lamps

The change to electric lighting is effected by placing the electric lamps in the existing standard oil switch lamps. The oil fount is replaced by an adapter which is mounted in the same position without alteration. This adapter is designed to receive the cable for current supply and accommodates a standard bayonet-base, single-contact lamp.

As the lamp chimney and ventilator are no longer required, the upper opening is closed by removing the chimney and soldering a thin copper disk in its place. The inside surfaces are then painted with aluminum to reflect as much light as possible. In some instances, especially in the dust-ridden territories of Western Kansas, the adapter is sealed at the bottom of the lamp with compound in order to exclude the dirt. Lamp renewals, which are seldom required, are made in such cases by removing a roundel.

Indicative of the battery life to be

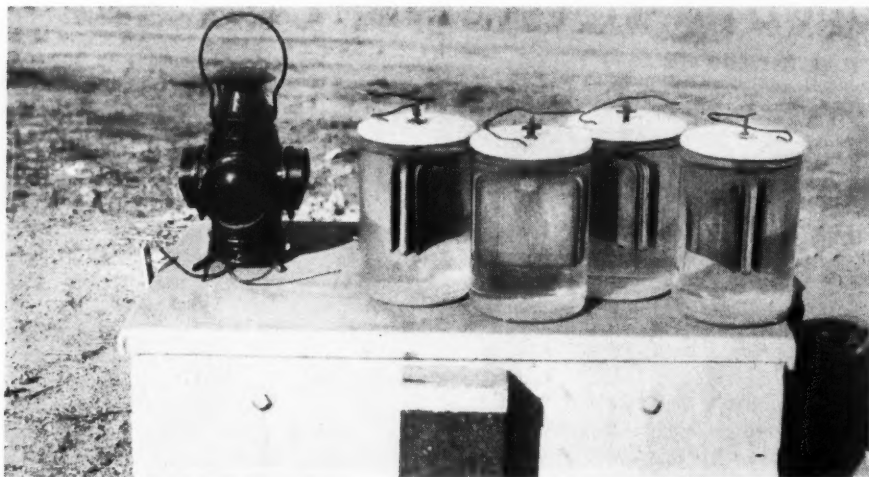


obtained with switch lighting, records obtained over one maintainer's territory show that approach-lighted installations, using the 0.3-amp. lamp, require renewal of the 500-a.h. primary battery after approximately 280

per month, or \$30 per year. It is believed, however, that an average annual cost of \$12 represents a conservative figure for use in making comparisons.

Experience shows that the electric

the table represent average costs when electric lights are added after automatic block signals have been placed in service, a small construction gang being used for the installation. If the work is done during the con-



This Battery Renewed After 300 Days, Serving in the Yards. The Switch Lamp Has Been Overhauled for Electric Lighting

days' service in a yard area, depending on traffic volume. On the other hand, at a blind siding, one battery gave 1,330 days, or almost four years' service before renewal.

Other locations commonly show battery life of 500, 650, or 1,000 days. The average of 73 renewals, divided among 19 batteries in this territory is 530 days. Computed on the basis of this average figure and assuming the renewal cost as \$1.25 per cell or \$5 per battery, the energy cost amounts approximately to \$3.44 per year per light.

#### Electric vs. Oil Lighting

The Santa Fe has not found electrical operation of switch lights applicable under all conditions. While primary battery may be installed almost anywhere, the means of approach control, housings, etc., may involve expenditures too great to be justifiable.

An oil lamp may be installed on a switch stand for about \$9, but the cost of operation and maintenance is subject to considerable variation. It has been found that where several lamps are located close together, as in yards, they can be maintained at a lower cost than the same number of lamps scattered over a longer territory, as on the main line. Cost studies indicate an outlay of \$12 to \$18 per year for the maintenance of oil lamps with four-day founts, and \$10 to \$12 for lamps with seven-day founts, although in some cases this cost has been shown to be as high as \$2.50

lighting of switch lamps provides a stronger light and insures greater reliability. Strong winds may extinguish the flame of an oil lamp, and the lamp must be cleaned and refilled at least once each week, and inspected frequently in order to avoid failures.

struction of automatic block signals, the cost of installation is ordinarily about \$8 below the figures given in the table.

The Santa Fe has experienced no difficulty with the La Junta-Dodge City installation of electric switch

#### Cost of Various Elements Entering into Electric Switch Lighting

	Cost of Installation	Annual Maintenance and operation
(1) Continuous lighting—a.c. ....	\$35	\$ 7.70
(2) Continuous lighting—d.c. ....	45	15.50 to \$30.50
(3) Sun relay—d.c. ....	85	16.50
(4) Approach lighting on d.c. with switch indicator (new work) .....	48	9.00
(5) Approach lighting on d.c. with switch indicator (old installations) .....	66	10.50
(6) Approach lighting on d.c. without switch indicator .....	75	13.00

Note: Operation costs presume use of the 3.5-volt, 0.3-amp. lamp when batteries are used.

In comparison, an electric lamp requires very little maintenance, and is subject to only an occasional failure such as is encountered with automatic block signals.

#### The Cost Varies

The cost of installing and operating electric lights varies considerably, depending upon the kind of current available, the length of cable or wiring which must be installed to connect the source of power and, where approach lighting is used, the method of control and the density of traffic at the particular location where the lamp is installed. The installation cost also varies considerably according to the method employed. The figures in

lamps. On the contrary, the indications obtained from these lamps are generally better than those obtainable from oil lamps. As the present practice is to allow the bulbs to operate until the filaments break due to vibration or natural exhaustion, an electric switch lamp need not be opened for long periods of time. As the lamp filaments often last for two years or more, as do the batteries, failures in service are few.



# What's the Answer?



## Disposing of Precurved Rail

*Can rail that has been precurved be transposed? Is it suitable for relaying in secondary tracks when released? In yards and sidings? If not why? If so, how should it be laid? Does the weight of the rail or the degree of curvature make any difference?*

### Not Suitable for Relaying

By G. N. EDMONDSON  
Engineer of Track, New York Central,  
New York

So far as the eastern lines of the New York Central are concerned the question of precuring rail is of minor importance, since in general, our curvature is so light that we do very little precuring. The only precuring that we have done recently has been in connection with the West Side Improvement project, where we have purchased special turnouts, curved switches, curved lead rails and curved frogs for some of the sharp curvature that occurs on that work. On the other hand, we have not precured the rails for the running tracks outside the limits of the leads. Some years ago we did considerable precuring but we find, generally, that it is unnecessary and the practice has been almost wholly discontinued.

This brings us to the question whether rail that has been precurved can be transposed. I presume that the outside rail on a curve could be shifted to the inside without reversal the same as a rail that has not been precurved, but generally any precurved rail that we have taken out of the track has been scrapped as unfit for further use.

I do not consider released precurved rail suitable for laying in secondary tracks, yards or sidings. In general, if such rail were to be relaid it would be necessary to use it on tangents and it certainly would not be suitable for such use, because it would not lay straight.

I question whether the weight of the rail makes any difference. My experience is that when laying rail on curves without precuring it, the rail

curves with about the same ease regardless of the weight. Obviously, however, the degree of curvature does make some difference.

### Should Not Be Precurved

By G. S. CRITES  
Division Engineer, Baltimore & Ohio,  
Punxsutawney, Pa.

Ordinary T-rail should not be precurved, for to do so the metal must be distorted and stressed beyond the elastic limit before the rail is put into use. It may sometimes be necessary to precure grooved-girder or heavy-girder rails for laying in short turnouts or around very sharp curves; but when this is done with these unusually heavy sections of rail, the internal stresses set up in the rail section do not seem to be so undesirable as those that occur in T-rail sections. It follows, therefore, that T-rail should not be precurved, particularly since it can be laid readily and held in place on very sharp curves with the modern track fastenings that are available.

Under heavy traffic, rails that are laid without precuring on sharp curves assume a permanent set; the outer rail particularly taking a set that conforms to the degree of curvature. Occasionally, the inner rail may obtain a slight set in the opposite di-

### To Be Answered in February

1. In what ways and to what extent does heavy rail affect track maintenance costs?
2. What advantages, if any, are there in equipping bridge and building gangs with portable wood-working machines? Of what types? How should they be driven?
3. Should a stock of track materials be maintained at a large yard? Why? If so, what materials should be carried? If not, how should they be obtained?
4. What are the relative merits of steel and wood sash for enginehouses? For shops? Under what conditions should each be used?
5. To what extent should the section forces be required to keep surface ditches clear of ice and snow during the winter and early spring? Why?
6. What is the maximum practical rate at which water can be delivered to locomotives? What considerations determine this?
7. What advantages, if any, are there in selecting the largest ties for joint ties? For use on curves?
8. What satisfactory methods can be employed to protect overhead structures from the effect of locomotive gases?

rection, owing to the extra outward thrust to which it is subjected under the rolling load, and the compacting action of the wheels on the gage side. The best thing to do with a rail that has taken a permanent set under traffic is to switch the outer rail directly across the track to the inner side of the curve, thus making the unworn side of the head the gage side. This should be done while the head of the rail still has sufficient metal properly to withstand the wheel loads to which

**Send your answers to any of the questions to the What's the Answer editor. He will welcome also any questions you wish to have discussed.**

it will be subjected in its new position. In making the transposition of the inner rail to the outside of the curve, it should be turned end for end, thus bringing the former gage side of the head to be the gage side in its new position. Again, this transposition should be made before the rail is worn so much that the head has become roughened to the extent that it is not suitable for further use.

Rails from the outside of the curve, which have either been precurved or have taken a permanent set under traffic without precuring, are not suitable for relaying in straight track, even in yards or on sidings. They may be used on the inside of curves or on the inside transfer of turnouts in yards and sidings. When so used,

the unworn side of the head is laid as the gage side. Precurved rail from the inside of curves usually straightens out under traffic and, if the surface of the head is in sufficiently good condition, it may be used on tangent in yards and sidings. When laying rails from the inside of curves in yards and sidings, the original gage side should be retained as the gage side, since the outside of the head of such rail is usually scabby with overflashed metal.

Heavy sections of rail laid with modern track appliances behave approximately the same as the lighter sections did formerly. There is no difference in the action of the heavier sections taken from curves and of lighter sections in the same locations.

culverts, to determine whether camber should be inserted in the gradient.

Head walls should be placed if the surrounding embankment is vulnerable to seepage or the water is of sufficient volume or velocity to induce scour. Care should always be taken to insure in the design of the culvert that it will not be abused through the assignment of loads that are too great for it to bear.

## Not Many Failures

By C. C. WESTFALL

Engineer of Bridges, Illinois Central,  
Chicago

Based on my own experience, failures in culverts do not present a particularly serious problem. As it is worded, the question infers, first, that culvert failures are common; and, second, that there is some particular condition which causes such failures. Our experience is directly contrary to both of these presumptions. On this road, now about 87 years old, with culverts of practically every type that has been used in American railway construction, culvert failures have been rare. Those which have occurred may, in general, be attributed to the fact that the culverts had been installed when railway loadings were very light, and then finally gave out under the increased loads they were called on to carry.

It is asking too much to expect a light, vitrified-pipe culvert, such as was used widely 50 years ago, to stand up under the loads of the last 15 years, and the breaking of these pipe culverts was to be expected. Similarly, many of the cast-iron pipes installed years ago were of very light section, unequal to present-day loadings.

Considering this question from a strictly structural standpoint, it may be said that culvert failures, in general, are so uncommon that they may be considered in the same way as failures in any other type of construction and that their occurrence will result from causes which could not have been foreseen. This is on the assumption that a correctly designed culvert has been installed properly.

We have had some experience with culverts that have opened up at the joints, but this trouble has not been difficult to correct. We have also had trouble with culverts carrying water from coal mines, which has caused disintegration of concrete and has even eaten through cast-iron pipe. Such cases, however, result from unusual conditions where it would be difficult, if not impossible, to foresee results, and should lead to the taking of further precautions in choice of

## Why Failures in Culverts?

*What are the most common causes of failure in culverts? How can they be overcome?*

### Limits to Pipe Culverts

By H. M. TREMAINE

District Engineer, Northern Pacific,  
Spokane, Wash.

This question presumably relates to pipe culverts; otherwise its scope would be too wide for a discussion in the *What's the Answer* columns. There are two kinds of pipe culverts—rigid or self-sustaining, and non-rigid, a type that must be sustained.

Rigid pipe culverts commonly fail by reason of (1) disintegration or breaking down because of faulty materials or manufacture; and (2) faulty foundations. The cure for the first case is proper investigation and inspection of the raw materials, including chemical tests of aggregates, and of the manufacturing process. To overcome the second cause, foundations should be constructed with sufficient strength to support the culvert and its super-imposed load. In case of doubt, this strength may be assured through actual test, although ordinarily inspection by a person of experience will suffice. Care should be exercised to assure a foundation of uniform bearing capacity; otherwise, if a slight settlement, which is sometimes allowable, occurs in some parts of the foundation, the culvert may be broken.

Non-rigid pipes also commonly fail from two causes, (1) faulty installation and (2) from soil action. A non-rigid pipe culvert must be supported by thoroughly tamping material along its sides to a height equal to one-half its diameter. This tamped material

must be capable of preventing distortion or flattening of the culvert when its ultimate load is applied. Ordinarily, if possible, such a pipe should be installed in a trench excavated in original undisturbed ground.

Sometimes pipe culverts have their lives shortened seriously through the effect of alkali and possibly certain other unfavorable constituents of the surrounding soils. In case of doubt, the interested manufacturers are glad to be of assistance in analysing soils to determine whether they are harmful.

Obviously, all pipe culverts may be harmed by rough handling prior to installation. Too much emphasis can not be placed on careful handling of the pipes, regardless of kind or type.

To insure against failure of function, all culverts, whether intended for irrigation or drainage, should be staked by engineers after careful levels have been run in the bed of the stream for a sufficient distance both above and below to determine the proper elevation and gradient. It is important also, particularly in long



materials or type of structure for future installations. The failure of a culvert by being "blown out" because of insufficient waterway, is aside from the question.

In answer to the second query, it will be necessary to take into account the character of the water to be carried by the culvert, in choosing the kind of material to be used. Then, pick a culvert of proper strength for the load to be carried, install it according to accepted practice and then forget about the culvert.

### Causes Are Many

By DAVE KIRKLAND

Bridge and Building Department, Chicago, Rock Island & Pacific, Fairbury, Nebr.

Culverts fail from many causes, but most failures can be prevented by careful preparation before installation is undertaken. Every maintenance officer is familiar with the type of failure commonly known as crushing. As a matter of fact, this is usually a collapse, either slow or rapid, of the structure, which results from overloading, improper design or inferior materials. In this case, the cause indicates the method of correction that should be followed.

Another common cause of failure is insufficient waterway. While this can sometimes be laid at the door of the designer, it more often results from changes in the drainage area, which could not be foreseen at the time of construction or, if foreseen, could not have been provided for. When it is apparent that a culvert is forming an obstruction to the run off from the drainage area, a larger opening should be provided, after securing all of the pertinent data on drainage, volume and rate of runoff, possibilities of drift collecting at the opening, and full information concerning the stream bed and erosion both above and below the site of the culvert. With these data, it should not be difficult to design a culvert that will give no further trouble from this cause. A periodic check of conditions in drainage areas may be the means of averting the failure of culverts.

If the existing culvert is in good physical condition it is, sometimes preferable to place the new culvert adjacent to it, leaving it in place as an additional opening. In any event, due consideration should be given to the flow line and the direction of the current so that properly designed head walls, wing walls and aprons may be incorporated in the construction. If the floor is below the flow line the effective area of the opening will be reduced; if too high it may be under-

cut and result in failure of the head walls, wing walls, tail walls or side walls. In either event the embankment will be endangered.

Backwash at the discharge end has caused the failure of not a few culverts. Except on steep hillsides, this can usually be corrected by installing an apron to sufficient depth, by placing grouted riprap, or both. I have seen cases, however, where a flume or other means became necessary to

prevent damage from this cause.

While there are many more reasons why culverts fail, those that have been mentioned are the most common. Some of the others are purely local in character, as damage from mine water or subsidence of foundations from draining swamps. All of those which have been discussed can be prevented by accurate surveys preceding the designing, by careful designing and by good construction practices.

## Short Line Kinks with Stone

*What causes short line kinks in track ballasted with stone? What methods can be employed to overcome the trouble? Do they occur with other kinds of ballast?*

### Raise Out of Face

By J. B. MARTIN

General Inspector of Track, New York Central, Cleveland, Ohio

Short line kinks are more common in stone-ballasted track than in track having other types of ballast, and this can be traced to the nature of the ballast. Stone ballast consists of irregular pieces and when there is any looseness these pieces are inclined to roll under traffic. This permits the track to get out of line, and it is difficult to line out these irregularities, except when the track is being surfaced. I believe that the presence of these line kinks is generally evidence that the track needs to be raised out of face.

It is not possible to maintain good surface and uniform bearing on stone ballast by continued spot surfacing, for there will be spots where the stone is rigid and others where it is comparatively loose. It is conditions of this kind that permit line kinks to develop. If the track is raised out of face periodically and lined carefully as a part of that work, the presence of line kinks will be minimized.

### May Be Centerbound

By MAURICE DONAHOE

Division Engineer, Alton, Bloomington, Ill.

I am not aware that track ballasted with stone is more subject to short kinks than when ballasted with other kinds of ballast. As I understand the question, tight rail is not to be considered as a factor. Stone ballast is crushed to cubes and irregular shapes that should interlock and adhere to the ties to hold the track to line better than gravel or some other kinds of

ballast, provided the track has a full ballast section.

Track that becomes centerbound, that has irregular cross level, or that has soft ties grouped together here and there, will get out of line in short stretches in any kind of ballast. This is particularly true when the ballast section is not up to standard and the shoulders are slack. If the rail condition cannot be improved, the remedy for this condition is to have the cribs filled, the ballast shoulder full, bad ties renewed and the track gaged.

### Needs a Lift

By DISTRICT ENGINEER

Line kinks are not confined to any particular kind of ballast any more than other track defects are. Line is so intimately interdependent with surface, gage, tie condition, adequacy of ballast and roadbed section, and drainage, that it is difficult if not impracticable to segregate ballast from all of these other factors and say that certain effects arise solely because of the type of ballast in use. This is particularly true on lines that are not well maintained.

On the other hand, experienced trackmen have noted that on well-maintained tracks, short line kinks occur in stone ballast, of a kind that is not found in other kinds of ballast, except the hard slags that are quite similar to crushed stone in their characteristics as ballast. They are not troublesome in track that has been newly surfaced, that is, raised an inch or more from the old bed. They do not result from tight rail, centerbound track or slack ballast shoulder, for they are found where none of these conditions exist, but are usually less common where there is a good shoulder.

Once these kinks appear in a section of track, there is only one way to get rid of them, and this is to give the track a light raise. Efforts to eliminate them by lining alone always result in failure, since the track slips back into its original position after the first train.

### Not Peculiar to Stone

By J. MORGAN  
Retired Supervisor, Central of Georgia,  
Leeds, Ala.

Kinks in line are not peculiar to stone ballast, for every experienced trackman has seen them in other types of ballast. I do not believe that the ballast is, of itself, a contributing factor. Obviously, if the ballast is

allowed to get foul and does not drain, if the ballast and roadway sections are not up to standard or if gage is not maintained, one may expect to see short line kinks in the track.

If, on the other hand, the ballast is sufficient and clean; the ties are sound; the track is to gage and to surface and is level; and the tamping has been done uniformly, there should be no line kinks. If these items have been cared for properly, line kinks probably result from settlement of the roadbed or lack of uniformity in tamping. It should not be overlooked, also, that as speeds increase the tendency of the track to go out of line is increased, particularly if irregularities have been allowed to creep into the gage, or the track is even slightly out of cross level.

## Pitch for Tar and Gravel Roofs

*What is the maximum allowable pitch for a tar and gravel roof? The minimum? What considerations determine this?*

### Avoids Their Use

By A. B. NIES  
Assistant Engineer of Buildings, Michigan  
Central, Jackson, Mich.

We aim to provide a maximum pitch of  $\frac{3}{4}$ -in. to the foot; the minimum varies with the type of construction. That is, on frame construction we have used a pitch of  $\frac{1}{2}$  in. to the foot as the minimum, while we have used considerably less than this on concrete slabs. Our experience with tar and gravel roofs has led us to avoid the use of gravel where possible, as it has caused a great deal of expensive maintenance on sewers and drains. We have also had trouble with gravel getting into troughs and conductors, where, when saturated, they freeze—bursting the joints of both troughs and conductors, making it necessary to renew them.

### No Angle of Repose

By G. S. CRITES  
Division Engineer, Baltimore & Ohio,  
Punxsutawney, Pa.

Neither tar nor asphalt has any angle of repose when subjected to the direct rays of the sun during warm weather. Further, both absorb heat readily. Any compound for which pitch or tar forms the bonding vehicle, will lay absolutely quiet only on a horizontal surface when sub-

jected to heat. Therefore, when compositions of tar or asphalt are used for holding together gravel, slag or other substances for use on this type of roof, the roof should be as nearly a horizontal plane as practicable. Even on a horizontal roof, however, there is apt to be a running or spreading

of the tar or pitch into the gutters when it is subjected to the direct heat of the summer sun. It appears evident, therefore, that a tar and gravel roof should have no pitch other than a slight raise, sufficient to allow storm water to flow readily from it.

### Anything Under 2 In.

By E. R. TATTERSHALL  
Supervisor of Structures, New York  
Central, New York

A roof of this type should have a maximum pitch of 2 in. to the foot, while the minimum can be practically nothing, that is, the roof can be flat. If a tar and gravel roof has a pitch greater than 2 in. the tar is likely to soften and run under summer heat, so that the gravel will not remain in place.

There are economies in roofs of this type, since they last from 15 to 25 years and, if properly applied, should require only a small amount of repairs earlier than 20 years. However, since the surface is rough, dirt and snow do not clear from it quickly as on a smooth surface. Again, the slag or gravel works loose and is carried to the gutter, damming it up and necessitating frequent cleaning. Another drawback is the difficulty encountered in locating leaks. When they are found, one must clean off the gravel surface from a considerable area before the repairs can be made.

## Bolt Holes for Sway Bracing

*Should bolt holes for sway bracing on pile trestles be the same diameter as the bolt or larger or smaller? Why? If the latter, how much?*

### Use Same Diameter

By L. G. BYRD  
Supervisor Bridges and Buildings, Missouri  
Pacific, Poplar Bluff, Mo.

It has been my observation that many failures in piles and in the posts of frame bents occur at the points where bolts are used for attaching braces to the bents. This is especially likely to occur when the water level is subject to considerable fluctuation, rising and remaining for short periods above the bolt holes. Where this occurs three or four times a year or oftener, decay once started may progress fairly rapidly. This condition is aggravated where the hole is somewhat larger in diameter than the bolt. It is not confined to untreated

material, but also affects treated material that has been prebored, as well as that which has been bored in the field. Even pressure treatment of the holes bored in the field does not stop the trouble, for most of the posts develop seasoning cracks which permit the water to penetrate into the body of the wood more freely than it would if the holes were bored for a tight fit and not oversize.

It has been my practice to use  $\frac{3}{4}$  in. augers for boring holes when applying sway bracing with  $\frac{3}{4}$ -in. bolts. We find that where the hole and the bolt are the same diameter, there is less play and the bents are stiffer. When framing stringers for trestles, whether preframed or framed in the field, we use a 13/16-in. auger for boring holes for  $\frac{3}{4}$ -in. bolts. This is a dis-

tinct advantage in packing stringers, when the bolts go through three or four lines of stringers, for as a rule water seldom reaches the bolt holes in the stringers.

I consider it very important to apply sway or other braces to trestle bents in such a way as to insure completely sealed bolt holes, thus eliminating the penetration of water. Where the holes are larger in diameter than the bolts, besides affecting the posts or piles in the bent, the entire structure is weakened by the reduction in stiffness which can be obtained by making the bolt and the hole the same diameter.

### Must Be Tight

By H. AUSTILL

Chief Engineer, Mobile & Ohio,  
St. Louis, Mo.

It is essential that the connection of a brace to a pile be tight; otherwise the brace will not perform the function for which it was applied. It is quite desirable, therefore, to have a tight fit between the bolt and the hole through the brace. To insure this it is well to have the diameter of the hole  $1/32$  to  $1/16$  in. less than that of the bolt, provided the bolt can be inserted without splitting the brace or injuring the fibre of the wood.

Obviously, some woods split more readily than others. In general, whether a hole of less diameter than that of the bolt can be used depends upon the kind of wood, the thickness of the brace, the location of the bolt with reference to the end of the brace and its location with reference to the direction of the annual rings of growth. My own practice is to make the hole of the same diameter as the bolt. I know of no reason why it should be made larger.

### Should Not Be Larger

By GENERAL INSPECTOR OF BRIDGES

I see no point in making the holes larger than the bolts that are to go through them. Aside from other considerations, a hole bored in a member reduces the strength of that member at the start, and the larger the hole, the greater the reduction in strength. If we add the opportunities for decay afforded by such holes, we find the larger holes highly detrimental for they readily admit water around the bolt, and do not dry out quickly. It is difficult, and in most cases impracticable, to seal them against the entrance of water.

For these reasons, especially during

high stages in streams, water reaches the heart of the timber and remains in the wood for long periods. This is not good for treated material, while if shrinkage cracks are present in the timber the water will certainly penetrate to the untreated wood, and where water can enter in this manner, the organisms that produce decay can also enter.

Should the holes be smaller than the

bolts? This is almost as bad as the larger holes, if they are to be submerged, since the fibres around the hole will be distorted and broomed when the bolt is driven through. If the bolts and holes are made the same diameter, every purpose will be served, and such holes can be sealed effectively against the entrance of water by using any of several materials now on the market.

## Rail and Flange Lubricators

*On what grounds can the installation of rail and flange lubricators be justified?*

### Facts Easily Obtained

By C. H. R. HOWE

Cost Engineer, Chesapeake & Ohio,  
Richmond, Va.

While justification for the use of some items of roadway equipment can be based only on personal opinions of the value of the results obtained, such is not the case with rail and flange lubricators, for here facts and figures are readily obtainable, that can be applied to any specific case.

Formerly, curve-worn rails were a matter of concern to many railways, not only from the standpoint of the excess cost of frequent renewals, but also because there was always the danger of high-side derailments. Early experience with hand greasing of the rail demonstrated the value of lubrication in eliminating this type of derailment, while it showed clearly that abrasion could be retarded effectively. The monetary saving obtained by prolonging the life of the rail is a matter of comparative record and simple calculation, but the saving in wheel wear is less tangible, since it is distributed over so many different units. However, since frictional contact of one metal with another results in the abrasion of both, we may reasonably assume that the damage to the rail is equalled by the damage distributed over a great number of wheels, and that any inequality in respective hardness that modifies the rate of abrasion is offset by a difference in the cost of the materials involved.

It is generally agreed that there

is also an indirect saving brought about by decreased train resistance. Just what value can be attributed to this decrease would be difficult to determine in any specific case, owing to the variety and complexity of the factors involved. Little data are available on this subject, so that for the present it may be cited merely as an additional advantage of lubrication.

### Base on Economies

By T. E. RODMAN

Vice-President, Maintenance Equipment  
Company, Chicago, Ill.

In the beginning, rail and flange lubricators were installed primarily because experience with hand lubrication of the high rail on curves had shown that although the lubricant was generally applied intermittently, it reduced the rate of curve wear and thus extended the life of the rail. As further experience with automatic rail and flange lubricators has been gained, it has been found that their use results in other economies of particular importance to track maintenance. Among these are a still greater increase in the life of the high rail by reason of constant lubrication, a marked reduction in the amount of gaging and relining of curves, and, incidentally of spiking damage to ties, thus increasing their life also; while there is also a greatly increased life of switch points in the lubricated territory.

There is a corresponding increase in the life of the low rail on curves, resulting from either less superelevation or higher safe speeds at the same elevation, either of which tends to equalize the wheel loads between the high and low rails, so that there is less flow of metal on the head of the low rail. There is also less nosing of trucks on lubricated curves.



Derailment hazards, of the type known as high-side derailments, are almost if not completely eliminated, because lubrication reduces the friction between the wheel flanges and the rail, thus removing the tendency of the wheel flanges to climb the outer rail.

While it is assumed that the question intends that the justification for installations of rail and flange lubricators shall be based on economies in track maintenance and improvement in track conditions, there are also certain operating benefits which should be mentioned. These include increased train speeds with safety; decreased fuel consumption; greater tonnage ratings for locomotives where curvature governs such ratings; greater use factor of locomotives because of increased speed; increased life of locomotive wheel flanges operating over a district completely equipped with lubricators, more than doubling the intervals between the turning of locomotive tires. Furthermore, the lubrication of curves in yards stops wheel screeching and permits locomotives to operate around sharper curves.

Ignoring the operating advantages, however, installations of rail and flange lubricators can be justified best and most conservatively on the ground of the savings that can be demonstrated by reason of the reduction in curve wear in the territory on which the installations are being considered. Experience has shown that adequate lubrication will increase the life of the rail from two to four times, compared with rail that is not lubricated. In general, the installation can be justified if the life of the rail is only doubled.

One can readily determine the number of lubricators required for a given territory through a study of track charts and an inspection of the track. The number will depend on the length of the high rail on curves that each unit can protect and this in turn on the length and degree of the curves. The total annual cost for each lubricator will include a sinking fund based on a life of 10 years, and this should include the labor cost of installation and interest on the investment; the cost of replacement parts and the labor of applying them; and the cost of operation. The first two items are substantially fixed, but the latter will vary with the volume of traffic, that is with the number of wheels passing over the lubricator. It will include the lubricant and the labor of charging the lubricator.

Now, having the annual cost of the lubricated and of the unlubricated rail on the curves on the territory

under consideration, by adding the annual cost of lubrication to the former and obtaining the difference between the annual cost of the lubricated and the unlubricated rails we determine the annual saving from installing the lubricators. This saving

alone is generally sufficient to warrant the proposed installation, without taking into consideration any of the other benefits that have been mentioned, even though the flange wear on some of the curves on the district may have been slight without lubrication.

## How to Locate Water Columns

*What factors determine the location of water columns on main tracks? At engine terminals? In yards?*

### To Conserve Time

By C. R. KNOWLES  
Superintendent of Water Service, Illinois  
Central, Chicago, Ill.

A primary advantage of water columns for the delivery of water to locomotives is that the storage tank can be placed away from the tracks at points where limited space makes it difficult to locate the tank adjacent to the track. They also offer less obstruction to the view of engine and trainmen, and allow room for future track development, as well as better spacing of tracks where two or more tracks are to be served. Other advantages are that they may be moved with less expense than a tank, and where more than one column is provided, repairs can be made without interruption to service.

The proper location of a water column is important. Those serving passenger trains should be so located that water can be taken while passengers are being unloaded and loaded, and mail and express are being handled, thus saving time and eliminating an additional stop. When they serve freight trains, they should, if possible, be so located that trains will not block crossings or interfere with yard movements. Where coal is also to be taken, the water columns should be in close proximity to the coaling station in order to permit both coal and water to be taken without undue movement of the locomotives or train.

At engine terminals they should be located conveniently so that an engine may take water along with other supplies, such as coal, sand, etc., without switching or back-up movement. Water columns serving yard engine should be so located that they will not interfere with the movement of road engines handling trains or with the movement of engines to and from the engine terminal. It is important that engines do not block switching leads when taking water. In large yards, water columns should be lo-

cated at each end of the yard where road engines may take water after receiving their trains. In some cases this may mean considerable expense for pipe lines, but when train movements are frequent, the expense will be justified by the reduction in terminal delays and by the degree to which the movement of trains is facilitated. Whenever practicable, water columns should be located to serve two tracks, thus reducing the cost of the installation.

### They Are Flexible

By WATER SERVICE INSPECTOR

One of the principal advantages of water columns is their flexibility; that is, they can be erected with minimum disturbance to the track layout, while water can be delivered to locomotives at a number of points from a single service tank, and track changes can be made at relatively small cost with little or no interruption to the distribution of the water. Because of this flexibility the factors that determine the location of water columns are almost entirely those that relate to the convenience or economy of train operation.

On main tracks, where passenger trains take water, the columns should be so located that water can be taken while the station work is being done. The water columns serving passenger trains are often equally convenient for freight trains, but a different location may sometimes be demanded to avoid blocking important grade crossings, stopping the train on a grade or interfering with other trains. I have known cases where water columns have been erected at the outgoing ends of passing sidings so that water could be taken while waiting for superior trains. In this case, a supplementary tank may be necessary to insure a rapid delivery and to reduce the hazard of water hammer in a long supply line.

In yards, the location should be

such that the minimum time will be lost in getting to the water column and that engines taking water will not interfere with switching operations. In some cases it is important that road engines leave the yard with a full tank, and this may be a factor in deciding on the location.

At engine terminals there should be a water column on the incoming and also on the outgoing track. In general, it is preferable that the column on the outgoing track be so located that the hostler will fill the tank before he turns the locomotive over to its crew. On the other hand, where the locomotives must be stored for some time before they are called for, it may be well to have the column located so that water can be taken just before leaving the terminal.

### Not Very Definite

By R. N. FOSTER

Water Engineer, Wabash, Decatur, Ill.

It appears to me that the question is not definite enough to allow a very positive answer, particularly as it refers to yards and engine terminals, for the design and size of these facilities

will be important factors in determining the location of the water columns. In general, however, the factors to be considered are grade, station stop for passenger engines, blocking of important street crossings while taking water and the length of the line supplying the column. At engine terminals the water columns on the inbound track should be located where incoming engines can take water immediately if necessary; on the outbound tracks the location should allow the locomotives to take water the last thing before they move to the yard or to the point where engines are changed.

Other factors to be considered with respect to terminal water columns include their relation to other facilities, whether hostlers handle engines outside or inside, the length of the water-column line and whether locomotives run through the terminal or go into the enginehouse. In yards, the location should be such that the use of the water columns will not interfere with switching operations. They should be convenient to the point where engines normally take their so-called "spot time," and also where they will be available to road engines when they need to take water.

are operating one system bolt-tightening force which consists of 1 foreman, 11 men and 1 cook, and this gang normally operates on a regular schedule.

### No Set Time

By J. MORGAN

Retired Supervisor, Central of Georgia, Leeds, Ala.

Since there are so many reasons why bolts get loose, it hardly seems possible for one to have a set time to do the tightening. In other words, it is inconceivable that among these numerous causes one should predominate to the extent that it fixes an interval that would make periodic tightening desirable. During a long experience in track maintenance, I have found it desirable to start tightening bolts as soon as they give indication of becoming loose, regardless of the reason why this condition has arisen.

I have observed that some stretches of track will run almost indefinitely without a sign of loose bolts while others where conditions do not seem to differ greatly, will give considerable trouble from loose bolts. In one case, periodic tightening might be a waste of effort, while in the other considerable damage to the joints might result if the tightening were done only to a rigid schedule—not that I think that any sensible maintenance officer would go to this length. On the other hand, I am in favor of periodic tightening so far as it relates to the regular spring and fall tightening, which I believe is the custom on most roads.

## When to Tighten Bolts

*Should the interval between bolt tightening be determined by the tonnage passing over the track, or should the tightening be done periodically? Why?*

### Once a Year Enough

By ROBERT WHITE

Section Foreman, Grand Trunk Western, Saranac, Mich.

Bolts should be tightened once a year. If a good job is done at that time, except for an occasional joint, no tightening will be necessary for at least a year. It is true that a few bolts will work loose, but this is not an indication that all bolts need tightening. If the rail is old and the joint bars are badly worn the bolts may need attention more frequently than once a year, but not on rail that is being maintained in good condition. Bolts can be tightened too much as well as not enough. Extension wrenches should never be allowed for tightening bolts, as the results are almost as disastrous as those of under tightening.

I prefer to tighten bolts late in the fall, independently of any other work. If the joints are to be oiled, the bolts

should be tightened prior to the application of the oil. Some bolts usually break during the winter, and they should be replaced at once, and the track should be gone over in the spring to tighten such of these replaced bolts as may show evidence of looseness, as they are likely to.

### Favors Regular Intervals

By H. E. KIRBY

Assistant Engineer, Chesapeake & Ohio, Richmond, Va.

Bolts should be retightened to uniform tension at regular intervals. This does not necessarily mean that such retightening will not be determined by the tonnage passing over the track, as the traffic over a given district will be fairly constant from year to year. Experience will then indicate the required cycle of tightening. This time interval will, of course, vary between subdivisions in accordance with traffic and other conditions. We

### Traffic a Factor

By HENRY BECKER

Section Foreman, St. Louis-San Francisco, Rush Tower, Mo.

It is my observation that the volume of traffic has a very direct effect on joint maintenance in general and on the frequency with which bolts should be tightened in particular. This is not strange, for the joint assembly is made of a number of individual parts which wear against each other as the heavy wheel loads roll over them. For these reasons, the best time to tighten bolts is when they get loose and not according to some schedule which takes no account of the causes for loose bolts. Yet, I am in favor of going over the bolts in the spring and fall to make sure that we go into and come out of the winter with tight bolts.

# New Products Of the Manufacturers



## New Sheffield Section Motor Car

A LIGHT-WEIGHT section motor car, known as the Sheffield 49B, has been introduced by Fairbanks, Morse & Co., Chicago, to round out its line of light track cars that affords

car is designed to carry six to eight men but can be handled readily by two men; it has a speed of 32 miles per hour fully loaded and a speed of 15 miles per hour when hauling a trailer with a "pay load" weighing 4,000 lb.

The power unit is a one-cylinder,



The Sheffield 49B  
Light Section Car

a choice of body styles, while retaining the advantage of interchangeability of many parts. This car has



The New Engine Is Air-Cooled by a Blower  
Built into the Enclosed Fly Wheel

a pressed-steel frame, plymetal tool trays and a  $\frac{3}{8}$ -in. plywood seat, and is equipped with an 8-hp. air-cooled engine of distinctive design. The

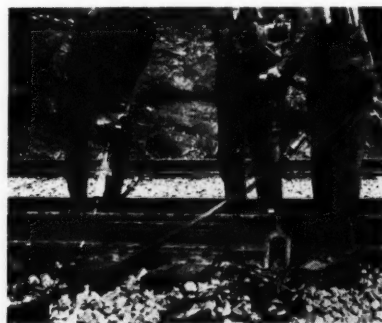
two-cycle, two-port engine with  $3\frac{3}{4}$ -in. bore and  $3\frac{1}{2}$ -in. stroke, with chromium-nickel-iron cylinder and aluminum piston. The cylinder is separate from the crank case, permitting it to be renewed separately. The crank has Timken bearings and is equipped with cup-shaped oil collectors that pick up oil out of the mixture and feed it into the hollow crank pin of the engine by centrifugal force.

The most distinctive feature of the engine is the forced-draft air-cooling system. This embodies an enclosed flywheel, with a blower built into it that delivers air to the front end of the engine, where it passes across the cylinder and cylinder head between the cooling fins. The engine has a Linkert carburetor and a dual throttle, whereby a hand lever controls both a butterfly valve in the carburetor and a by-pass valve between the crank case and the cylinder. It is said that this arrangement results in greater economy in the consumption of fuel and that it effects a substantial reduction in the hazard of fire.

## Powered Cribbing Fork

A NEW pneumatic-powered cribbing fork, designed especially for loosening the ballast in the tie cribs when skeletonizing track during ballast-cleaning operations, has been put on the market by the Ingersoll-Rand Company, New York, and is said, as the result of service tests, to be highly effective. This new fork has two strong steel prongs with chisel points, and a shank which is designed to fit into any Ingersoll-Rand MT-1, MT-2 or MT-3 pneumatic tie tamper, replacing the ordinary ballast tamping steel, or bar. In its design, special consideration was given to the length, shape and spread of the prongs, and also to their angle with the shank, in order to make the tool the most rapid and effective, with the least physical effort on the part of the operator.

Extensive use of the new forks on at least one road has demonstrated that they are not only effective in



The New Cribbing Fork Replaces the Ordinary Tamping Bar in the Pneumatic Tie Tamper

breaking up the most severely cemented ballast, but also that they carry out the work much faster than can be done with hand picks. It is said that two men, using MT-3 tie tampers equipped with the cribbing forks, can keep ahead of six men shoveling the ballast from the cribs, doing the work ordinarily requiring six pick men, four of whom can be released for other duties.

## Spray Painting Hose

A NEW type of hose for use with spray painting outfits, known as "du-al" hose, has been developed by the Eclipse Air Brush Company, Inc., Newark, N.J. The important feature of this hose is that it combines both the air and fluid conduits into a single unit, the tubes being united with a web of solid rubber which is molded in one piece with the outer casing of the hose. This hose is said to be as flexible in use as a single line and to handle as easily.

"Du-al" hose is said to be of special reinforced construction, combining the best features of both wrapped and braided hose through an arrangement of braids with an intermediate wrapping of high tensile cords. The inner tube is compounded to resist the chemical action of paints, lacquers, etc., and the outer sheath to resist chemical as well as abrasive wear.

For making standard connections, enough of the web of the hose is removed to allow the tubes to be spread to the required outlets, further splitting being prevented by a tight-fitting collar. "Du-al" hose has a  $\frac{3}{8}$ -in. fluid passage and a  $\frac{5}{16}$ -in. air passage.

## New Admixture for Floor Mastic

THE Flexrock Company, Philadelphia, Pa., has developed a new admixture for mastic or semi-mastic floor patching materials, which is used as a substitute for the portland cement ordinarily used as a hardening agent in such materials. The new admixture, known as Firmflex, is supplied in powder form. When mixed in the proper proportions with ordinary commercial mastic or semi-mastic patching material and stone and sand aggregate, it produces a floor, it is said, which has a hard durable surface that will withstand heavy loads without marring or cracking.

New or repaired floors employing Firmflex are said to be highly resistant to grease and oils, but the material is not recommended for floors which are exposed to water or acid conditions. The use of Firmflex, it is claimed, increases the workability of ordinary patching compounds, and permits carrying the work out to a feather edge. For patching, it is recommended that the mix include 1 part mastic patching material,  $1\frac{1}{2}$  parts Firmflex, and 3 parts of coarse, washed sand. For resurfacing a large area, or an entire

floor, it is recommended that 3 parts of  $\frac{1}{4}$ -in. or  $\frac{1}{2}$ -in. crushed hard stone be added to the patching mix, without changing its proportions. Whether used for repair or resurfacing work, mastic containing Firmflex is trowled in place over a special primer furnished by the company.

## New Alloy Steel Rod

A NEW gas welding rod, capable of producing welds of high ductility, and said to be highly adapted to all classes of steel pipe and plate welding, has been developed and put on the market by the Air Reduction Sales Company, New York. This rod, which is designated the Airco No. 1 High Ductility Alloy Steel rod, was designed to meet the present-day demand for increased ductility and strength in both single and multi-layer welds. It is said that it not only improves welds in these respects, but that it has the ability to withstand considerable heating without burning, which impairs many welds.

It has been said that examination of many welds made with the new rods show the following physical characteristics:

Free bend ductilities of single layer welds range from 20 to 30 per cent, depending upon the composition of the steel.

Free bend ductilities of multi-layer welds up to 40 per cent on low and medium carbon steels.

Ultimate tensile strengths in excess of 60,000 lb. per sq. in.

Specific gravity of welds, 7.80—7.86.

Charpy impact values on keyhole notched specimens at 70 deg. F., from 15 to 30 ft. lb.

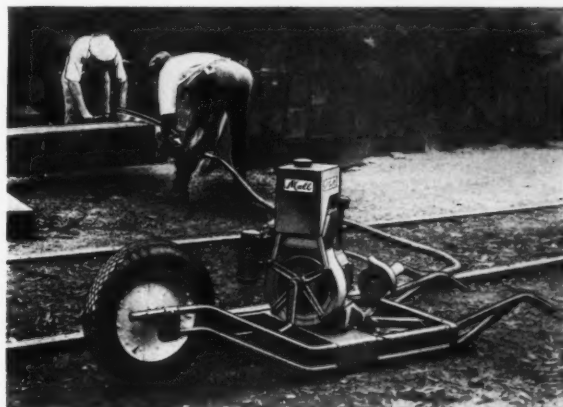
Rockwell hardness of weld metal from B60 to B85, depending on the carbon content of the base metal and the type of weld.

## New Direct Drive Chain-Link Saw

A NEW design of light-weight, portable, chain-link saw, operated directly from a gasoline engine, has been developed by the Mall Tool Company, Chicago. This saw, which comes in two sizes, with cutting capacities of 24 and 36 in., respectively, is driven directly from either a 3 or 5-hp., single-cylinder, 4-cycle, air-cooled gasoline engine, by means of flexible shafting. The engine with its flexible shaft is mounted on a welded tubular frame which is equipped with a 20-in. pneumatic rubber-tired wheel, so that the entire unit can be handled like a wheel barrow. The engine itself is mounted on a swivel base and can be revolved through 360 deg., making it unnecessary to move the equipment to make different cuts.

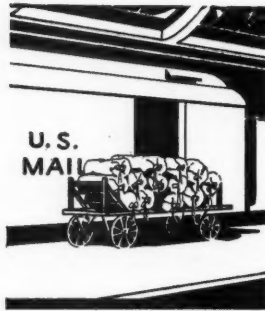
Standard  $\frac{5}{8}$ -in. flexible shafting in 7-ft. lengths can be used to give a working radius up to 28 ft. The saw clutch, which is attached to the saw housing, is a special oil-disc type. The spindle, which runs in ball bearings and has a speed of 3,600 r.p.m., has heat-treated spiral-cut bevel gears, with a ratio of 12:40, to assure smooth operation. The spindle housing is of aluminum to minimize weight. The saw teeth are of forged steel, electrically heat treated and hardened, and are easily replaced. The weight of the 24-in. saw is 46 lb., and that of the 36-in. size is 58 lb., both including the clutch.

In designing this equipment, particular attention has been given to safety in operation. The top flight of the saw teeth has a safety guard which passes through the cut with the saw. The strength of the chain in relation to the drive from the power unit is said to provide a liberal safety factor. In addition, the sprocket shaft is fitted with a shear pin to protect the machine from sudden shocks or strains.



One of the New Saws in Operation

# News of the Month



## Air-Conditioned Cars Total 10,000

Nearly 10,000 air-conditioned passenger cars owned by the Class I railroads and the Pullman Company were in operation on October 1, according to J. J. Pelley, president of the Association of American Railroads. Class I railroads on October 1 had 5,196, and the Pullman Company had 4,666 air-conditioned passenger cars in operation. These figures include sleeping cars, lounge cars, and other passenger equipment. In the first nine months of 1937, air-conditioning devices were installed on 1,784 passenger cars, of which 1,270 passenger cars were owned by the railroads and 514 were owned by the Pullman Company.

## Armco Dedicates New Research Laboratories

A new structure embodying novel features of design, which was constructed at Middletown, Ohio, to house the research laboratories of the American Rolling Mill Company, was dedicated on November 5 with more than 200 scientists from all parts of the country participating in the ceremony. This structure, built at a cost of \$280,000, is one-story high and embodies many products which were developed by the company's research organization. Designed in the modern "streamlined" motif, it presents on the exterior a blend of porcelain enameled iron, stainless steel and glass block. It has a frontage of 255 ft., a depth of 175 ft. and has 43,500 sq. ft. of floor space. The structure is completely air-conditioned.

## Railroads Request 15 Per Cent Rate Increase

Increases of 15 per cent in railroad freight rates and 25 per cent in Eastern coach fares are requested in a petition filed with the Interstate Commerce Commission on November 5 by the Association of American Railroads. In its petition the association declared that inadequate earnings and rising costs of operation have placed the railroads of this country in a critical situation which, if not remedied, may lead to serious impairment of their ability to render efficient service.

Calculated on the basis of operation for the year ending June 30, 1937, it is estimated that operating expenses and taxes, as they will be on and after January 1, 1938, will be higher at the rate of \$664,789,000 per year than those obtaining in

May, 1933. While increases in rates aggregating about \$50,000,000 annually have already been awarded by the commission, increases in expenses totaling \$614,789,000 remain "wholly uncompensated for by increases in rates." If the commission should act favorably on the whole new proposal it is estimated that the yield therefrom would be about \$507,000,000 a year.

## Judge Fletcher on the Railroad Situation

A declaration by Congress to the Interstate Commerce Commission to the effect that the railroads "are entitled to earn a sufficient amount of money to pay their operating expenses" in addition to "a substantial return upon the value of the property," was urged by R. V. Fletcher, vice-president and general counsel of the Association of American Railroads, in a recent address at Peoria, Ill. Continuing, Judge Fletcher contended that there should be an end to serious efforts to enact "make work laws, the only effect of which is to increase the expenses in violation of the natural laws of trade and commerce." In this category, he said, is the train-limit bill now pending in Congress, the effect of which would be to "turn back the wheels of progress and to put artificial limitations upon the efforts of the railroads to practice economies which would permit the business of the country at the present time to be carried at reasonable rates."

## Freight Revenues and Commodity Values

Railroad freight revenues in 1936 averaged 8.47 per cent of the total value at destination of all commodities carried, as compared with 10.66 per cent in 1933 and 6.77 per cent in 1930, according to a statement issued by the Bureau of Statistics of the Interstate Commerce Commission. The percentage for 1936 is based on freight charges of \$3,430,000,000 and a total value of commodities shipped of \$40,480,000,000; that for 1933 is derived from freight charges of \$2,580,000,000 and a total value of commodities of \$24,200,000,000, and that for 1930 is based on freight charges of \$4,210,000,000 and a total value of \$63,090,000,000. In a statement accompanying these statistics it is explained that "the figures do not show nor are they intended to show whether freight rates are too high or too low. Freight rates are not proportionate to the value of commodities. To make them

so would produce exorbitant rates in many instances, although it is true that the more valuable finished manufactured products usually are made to bear higher rates than the lower valued raw products that are carried."

## Truckers May Seek Freight Rate Increase

On the heels of the railroads' request for a 15 per cent increase in rates has come a movement among highway transport concerns to obtain a comparable boost in their rates. On November 4 the Middle Atlantic States Motor Carrier Conference, whose members represent 600 highway freight carriers in the East, met in New York and afterwards indicated that a horizontal increase of 15 per cent in trucking rates might possibly be sought. On November 8 another meeting, attended by trucking representatives from a greater area in the East, was held at New York at which the matter of increased rates was discussed. At this meeting a committee was appointed to meet later in the month with representatives of Western and Mid-Western motor truck interests.

## Riggs Nominated to Head A.S.C.E. in 1938

Henry E. Riggs, honorary professor of civil engineering at the University of Michigan, who has long been a student of railway economic problems and especially of railway valuation matters, has been selected by the board of directors of the American Society of Engineers as official nominee for president of the society for the year 1938. This nomination is equivalent to election. Early in his career Prof. Riggs served for several years in the engineering departments of the Chicago, Burlington & Quincy and the Atchison, Topeka & Santa Fe, following which he was chief engineer of the Ann Arbor for six years before entering consulting practice. From 1912 to 1930 he was professor and head of the department of civil engineering at the University of Michigan.

## September Railroad Net in Downward Trend

In September the Class I railroads of the United States had a net railway operating income of \$59,304,948, which was at the annual rate of return on their capital investment of 1.96 per cent, as compared with \$70,096,166, or 2.32 per cent, in September, 1936, according to the Bureau of Railway Economics of the Association of American Railroads. This decrease, says the A.A.R., "was due to rising costs of operation, which include increased cost of materials, supplies and fuel and also a higher wage rate." Operating costs in September were 5.7 per cent above those for September, 1936, while gross revenues were only 1.7 per cent above the same month a year ago. Gross operating revenues for September amounted to \$363,070,851 compared with \$357,058,214 in September, 1936, while operating expenses totaled \$262,711,697 as compared with \$248,450,132.

## Personal Mention

### General

**R. K. Johnson**, supervisor of signals and water supply, on the Chesapeake & Ohio, with headquarters at Peru, Ind., has been promoted to supervisor of reclamation, with headquarters at Barboursville, W. Va., to succeed **Walter Constance**, deceased.

**James A. Walsh**, bridge, building and paving inspector on the Reading with headquarters at Philadelphia, Pa., has been promoted to master carpenter on the Philadelphia division, succeeding **Edward G. Storck**, who has retired after 43 years service with this company. Mr. Walsh entered the service of the Reading on March 7, 1921, as a levelman in the engineering department, later being advanced to transitman. Subsequently he was promoted to bridge, building and paving inspector, which position he held until his recent promotion.

**Harry A. DeButts**, general manager of the Eastern lines of the Southern and an engineer by training and experience, has been appointed vice-president in charge of operation, with headquarters at Washington, D. C. Mr. DeButts was born on October 13, 1895, at Delaplane, Va. He attended elementary and high schools in



Harry A. DeButts

Virginia and was graduated in civil engineering from Virginia Military Institute in 1916. He entered railroad service with the Southern on July 6, 1916, serving until June 30, 1917, as student apprentice on section and extra gangs and section foreman at Buena, Va. He then became general yard foreman at Alexandria, Va., being appointed assistant track supervisor at Strasburg, Va., on November 16, 1917. After service with the U. S. Marine Corps, he returned to the Southern as assistant track supervisor at Manassas, Va., on June 1, 1919, becoming track supervisor at Strasburg four months later. On December 1, 1920, he became assistant trainmaster at Birmingham, Ala.; on June 4, 1921, he was appointed trainmaster at Sheffield, Ala.; on Novem-

ber 1, 1923, assistant superintendent at Sheffield, and on June 18, 1924, superintendent of the Mobile division at Selma, Ala. After serving in the latter capacity at various points he was advanced to general superintendent at Danville, Va., on April 1, 1930. On August 1, 1934, he became general manager of the Eastern lines at Charlotte, N. C., which position he held until his appointment as vice-president in charge of operation.

**U. S. Attix** has been appointed general fire inspector in the office of the chief engineer of the Southern Pacific, with headquarters at San Francisco, Cal., to succeed **H. Pollard**, who has retired.

Mr. Pollard has a record of more than 40 years service with the Southern Pacific. He was born on October 28, 1872, at Lexington, Ill., and after obtaining a public school education he studied railroad engineering through the International Correspondence Schools. He entered railway service on September 27, 1897, with the Southern Pacific, his first position being in the bridge and building department. In April, 1903, he was advanced to division bridge inspector, and after about two years in this capacity he was further promoted to assistant general bridge inspector. Since July, 1920, Mr. Pollard has held the position of general fire inspector.

### Engineering

**T. Z. Krumm**, chief engineer of the Minneapolis, St. Paul & Ste. Marie, with office at Minneapolis, Minn., has had his jurisdiction extended over all matters pertaining to maintenance of way.

**G. M. Taylor**, assistant district engineer on the Southern Pacific, with headquarters at Dunsmuir, Cal., has been promoted to district engineer, with the same headquarters, to succeed **J. A. Given**, who has been assigned to other duties.

**E. L. Anderson**, roadmaster on the St. Louis-San Francisco, with headquarters at Poplar Bluff, Mo., has been promoted to division engineer of the Eastern division, with headquarters at Springfield, Mo., to succeed **D. E. Gelwix**, resigned.

**E. Weidemann**, office engineer in the office of the chief engineer maintenance of way of the Western region of the Pennsylvania, has been appointed to the newly created position of engineer of bridges and buildings in the office of the chief engineer of the Western region, with headquarters as before at Chicago.

**W. G. Powrie**, engineer of water service of the Chicago, Milwaukee, St. Paul and Pacific, with headquarters at Chicago, in addition to his other duties, has been appointed assistant superintendent track maintenance, effective November 1. **A. Daniels**, assistant superintendent track maintenance, with headquarters at Chicago, has been appointed division engineer of the Twin City Terminal and of the Iowa & Southern Minnesota division, with headquarters at Minneapolis, Minn., to succeed **E. W. Bolmgren**, who has been transferred to the La Crosse & River division, with headquarters at La Crosse, Wis. Mr. Bolmgren succeeds **H. B.**

**Christianson**, who has been transferred to the Dubuque & Illinois division, with headquarters at Savanna, Ill., where he succeeds **C. E. Crippen**, who has been appointed assistant engineer in the office of the chief engineer at Chicago.

Mr. Powrie was born on August 5, 1904, at Milwaukee, Wis., and first entered railway service in 1920 with the Milwaukee, at which time he served for three months. He returned to the service of this company in 1923 as a chainman in



W. G. Powrie

the district engineer's office at Minneapolis, Minn., being advanced successively through the positions of rodman and instrumentman. Five years later he was promoted to assistant engineer at Mason City, Iowa, and on January 1, 1930, he was appointed assistant to the general supervisor of bridges and buildings at Chicago. In 1931 Mr. Powrie was promoted to division engineer of the Iowa and Southern Minnesota division, with headquarters at Austin, Minn., being transferred to Savanna, Ill., later in the same year. In August, 1932, he was appointed assistant engineer at Chicago, in which capacity he was in charge of water service matters. In the spring of 1935 he was appointed engineer of water service, with the same headquarters, which position he still holds in addition to that of assistant superintendent of track maintenance.

**Charles H. Morse**, assistant engineer on the New York Central System, with headquarters at New York, has been promoted to office engineer to the chief engineer maintenance of way of the system, with headquarters at New York, succeeding **John F. McDonald**, who was retired on October 30, after 55 years of service. **G. T. Donahue**, supervisor of track, with headquarters at New York, has been promoted to assistant engineer in the office of the chief engineer maintenance of way, at New York, succeeding Mr. Morse.

Mr. McDonald was born on September 25, 1867, at Albany, N.Y., and, following early education at Albany high school, which he supplemented later by private tutoring and study, he first entered the service of the New York Central at the age of 14, on June 20, 1882, as a branch tender on the Mohawk division, at Albany, N.Y. In 1885, he became a laborer in the maintenance of way department on the Mohawk division at Al-

bany, and subsequently became a clerk and then assistant roadmaster on the same division. Following a leave of absence, from May 31, to December 21, 1890, Mr. McDonald resumed work on the New York Central and shortly became a chairman in the engineering department of the Eastern division, with headquarters at New York. Later, he was promoted to



John F. McDonald

rodman and then to junior assistant engineer, both at New York, and then, in 1896, to division engineer of the Eastern division, with headquarters at Rensselaer, N.Y. With the reorganization of the maintenance of way department in 1898, Mr. McDonald became a rodman in the engineering department, and later, sea wall inspector at New York. On November 1, 1902, he became a draftsman in the maintenance of way department, at New York, and on January 1, 1903, was promoted to office assistant in the maintenance of way department, with the same headquarters. Three months later, he was promoted to assistant engineer, which position he held until October 1, 1916, when he was promoted to office engineer to the engineer maintenance of way, with headquarters, as before, at New York. With the creation of the position of chief engineer maintenance of way, system, on October 1, 1927, Mr. McDonald was made office engineer to this new system officer, and held this position until he was retired on October 31, 1937.

Mr. Morse was born on September 14, 1885, at Brandon, Vt., and first entered railway service on August 13, 1902, as a clerk in the superintendent's office of the New York Central, at Watertown, N.Y. On September 10, 1907, he was transferred to the engineering corps of the maintenance of way department, and until October 23, 1909, he held successively the positions of chairman, rodman and transitman, all at Watertown. On the latter date, he became a draftsman in the office of the engineer maintenance of way, at New York, and along with his work during the next two years he attended evening classes at Columbia university. On June 20, 1912, he was promoted to assistant supervisor of track at Hudson, N.Y., and subsequently held this position at Poughkeepsie and at Corning, N.Y. On September 1, 1920, Mr. Morse was promoted to supervisor of track at Clearfield, Pa., and later held this position at

Kingston, N.Y. On April 16, 1929, he was promoted to general track inspector on the New York Central lines, Buffalo and East, with headquarters at New York, and on March 16, 1933, he was promoted to assistant engineer with the chief engineer maintenance of way of the system with the same headquarters. He was holding this position at the time of his recent promotion to office engineer, office of chief engineer maintenance of way, at New York.

Mr. Donahue was born on July 6, 1890, at Watertown, N.Y., and received his education at Ohio State university, graduating in civil engineering in 1915. He obtained his first railway service in the maintenance of way department of the Chicago, Burlington & Quincy, at Lincoln, Neb. In September, 1916, Mr. Donahue entered the service of the New York Central as a transitman on the engineering corps at Rochester, N.Y. Subsequently he served as assistant supervisor of track on the main line, and as assistant division engineer on the Rochester division and on the main line at Syracuse,



Charles H. Morse

N.Y. Next he was appointed supervisor of track, in which capacity he served at various locations until his recent appointment as assistant engineer in the office of the chief engineer. Immediately prior to this appointment Mr. Donahue was identified with work involving the extensive building of new layouts for the West Side improvements at New York.

**William J. Kernan**, assistant supervisor of track on the Mohawk division of the New York Central, with headquarters at Fonda, N.Y., has been promoted to assistant division engineer on the Pennsylvania division, with headquarters at Jersey Shore, Pa., succeeding **Fred B. Wilcox**, whose promotion to supervisor of track is noted elsewhere in these columns. **M. J. Gibbons**, assistant engineer in the office of the New York Terminal district of the New York Central, with headquarters at New York, retired on November 30.

**J. B. Dawson**, division engineer of the Tucson division of the Southern Pacific, with headquarters at Tucson, Ariz., has been transferred to the Los Angeles division, with headquarters at Los Angeles, Cal., to succeed **G. W. Corrigan**, who has

been granted a leave of absence, and has been succeeded by **H. E. Stansbury**, division engineer of the Rio Grande division, with headquarters at El Paso, Tex., who, in turn, has been succeeded by **F. A. Feikert**, assistant division engineer at Portland, Ore.

**F. J. Nevins**, valuation engineer of the Chicago, Rock Island & Pacific, with headquarters at Chicago, has been assigned to other duties at his own request because of continued ill health. The position of valuation engineer is abolished. **C. P. Richardson**, engineer water service at Chicago, has been promoted to engineer capital expenditures, with supervision over valuation and roadway expenditures for the investment account, and has been succeeded by **J. E. Tiedt**, engineer of water treatment at Chicago. **W. J. Govett**, assistant engineer in the valuation department at Chicago, has been appointed assistant engineer of capital expenditures. **Bert Matheis**, supervisor of bridges for lines east of the Missouri river, with headquarters at Chicago, has been promoted to acting division engineer at Ft. Worth, Tex., and has been succeeded by **S. P. Perkins**.

Mr. Richardson has been identified with the Rock Island continuously for more than 25 years. He was born on December 27, 1882, at Concord, N.H., and graduated from Dartmouth college in 1907. His first railway service was with the Missouri Pacific as an assistant on the engineering corps. Later he held the position of assistant division engineer and investigator on special work in the office of the chief engineer of this company at St. Louis, Mo. He entered the service of the Rock Island in August, 1912, as assistant engineer on track elevation work at Chicago. In November, 1918, he was appointed engineer of water service and in



C. P. Richardson

the following year he was assigned to the chief engineer's office as assistant engineer on special assignments. In February, 1920, he was promoted to division engineer of the Chicago Terminal division, holding this position until September, 1921, when he was made engineer of track elevation. In 1933 he was reappointed engineer of water service, which position he held until his recent appointment to the position of engineer of capital expenditures.

**R. M. Leeds**, assistant division engineer on the Louisville & Nashville at Louisville, Ky., who has been promoted to division engineer at Birmingham, Ala., as reported in the November issue, is 50 years of age and obtained his technical training at Rose Polytechnic Institute. Mr. Leeds entered the service of the Louisville & Nashville on October 1, 1910,



R. M. Leeds

as an instrumentman in the construction department, being promoted to roadmaster on October 1, 1916. He remained in the latter capacity until October 1, 1934, when he was promoted to assistant division engineer, which position he was holding at the time of his recent appointment as division engineer.

### Track

**W. F. Scott**, transitman in the engineering department of the Reading, has been appointed assistant supervisor of track at West Trenton, N.J.

**W. H. Johnson**, acting roadmaster on the Capreol division of the Canadian National, with headquarters at Capreol, Ont., has been appointed roadmaster with the same headquarters.

**J. L. Marsh**, a general foreman on the Los Angeles division of the Southern Pacific, has been promoted to roadmaster, with headquarters at Niland, Cal., to succeed **C. T. Mulcahy**, who has been transferred.

**R. B. Plowman** has been appointed roadmaster on the Canadian Pacific, with headquarters at Empress, Alta., succeeding **T. J. Purdie**, who has been transferred to Kneehill, Alta., to replace **H. A. MacClean**, who has been transferred to Calgary.

**Eugene J. Huelsman**, an extra gang foreman on the Cleveland, Cincinnati, Chicago & St. Louis (the Big Four), who has been promoted to track supervisor, with headquarters at Bellefontaine, Ohio, as reported in the November issue of *Railway Engineering and Maintenance*, was born on August 30, 1907, at Indianapolis, Ind., and received his education at a parochial school. He entered railway service with the Big Four on March 11, 1926, as a section laborer in the maintenance of way department. On April 1, 1931, Mr.

Huelsman was promoted to section foreman at Caledonia, Ohio, where he remained until May, 1932, when he was furloughed as a result of the consolidation of sections. In the latter part of 1932, Mr. Huelsman returned to service as an extra gang foreman, continuing in this capacity until October 1 of this year, when he was promoted to supervisor on the Ohio division, with headquarters at Bellefontaine.

**L. D. Gardner**, an extra gang foreman on the St. Louis-San Francisco, has been promoted to roadmaster on the 83rd Track division, with headquarters at Poplar Bluff, Mo., succeeding **F. L. Peters**, who has been transferred to the 84th track division, with the same headquarters. Mr. Peters succeeds **E. L. Anderson**, whose promotion to division engineer is noted elsewhere in these columns.

Mr. Gardner was born on September 13, 1898, at Flint, Ala., and first entered railway service on April 22, 1917, as a section laborer on the Northern Alabama (part of the Southern). On March 1, 1918, Mr. Gardner was promoted to section foreman and on July 5 of the same year he became an extra gang foreman, holding this position until October 1, 1922. On that date Mr. Gardner resigned to enter business for himself at Haleyville, Ala., where he remained until September 1, 1923, when he disposed of his business interests and entered the employ of the A. G. McKee Construction Company as general foreman on a government rock quarry project at Waco, Ala. Following the completion of this job on October 18, 1924, Mr. Gardner re-entered railroad service with the Central of Georgia as an extra gang foreman. On December 20, 1925, Mr. Gardner left this company to go with the Tennessee Coal, Iron & Railroad Company as yard foreman at Emsley, Ala. On August 1, 1926, he resigned from this position to go with the Frisco as an extra gang foreman. He served in this capacity and as a section foreman until his appointment as roadmaster, which was effective on November 1.

**T. Crawford**, who has been appointed assistant roadmaster on the St. Louis-Louisville division of the Southern, with headquarters at Louisville, Ky., as reported in the November issue, was born on January 28, 1894, at Fuller, Miss., and received his higher education at the Louisiana Polytechnical Institute. He entered railway service on June 15, 1915, with the Gulf, Mobile & Northern as a rodman, leaving this company on December 1 of the same year. On March 24, 1917, he entered the service of the Southern as a rodman at New Orleans, La., being promoted to instrumentman on September 15 of the same year. On January 1, 1919, he was made a junior engineer, with headquarters at Chattanooga, Tenn., being transferred to Macon, Ga., on April 1, 1920. Four years later he was promoted to assistant engineer at Macon, in which capacity he later served at Chattanooga. On January 1, 1933, he was advanced to supervisor of bridges and buildings at Somerset, Ky., and on October 1, 1934, he was transferred to New Orleans as supervisor of

bridges and buildings and tracks, which position he held until his recent appointment as assistant roadmaster.

### Changes on the New York Central

**Philip S. Burnaham**, transitman on the Electric division of the New York Central, with headquarters at New York, has been appointed assistant supervisor of track on Sub-division 30 of the Syracuse division, with headquarters at Rochester, N.Y., succeeding **Leonard M. Knopp**, who has been transferred to the main line, Sub-division 11, on the Syracuse division at Rochester, replacing **George Auer, Jr.** Mr. Auer has been promoted to supervisor of track at Corning, N.Y., to take the place of **Thomas P. Culligan**, who retired on October 31, after 54 years service.

**Clarence C. Lathey**, a draftsman in the maintenance of way department of the New York Central, with headquarters at New York, has been promoted to assistant supervisor of track on the Mohawk division, with headquarters at Fonda, N.Y., succeeding **William J. Kernan**, who has been promoted to assistant division engineer of the Pennsylvania division, with headquarters at Jersey Shore, Pa. Mr. Kernan replaces **Fred B. Wilcox**, who has been appointed supervisor of track on the Pennsylvania division, at Clearfield, Pa., where he takes the place of **William C. Carnes**, who has been transferred to the St. Lawrence division, with headquarters at Richland, N. Y. Mr. Carnes succeeds **C. T. Gunsallus**, who has been transferred to Sub-division 28, of the Electric division, with headquarters at New York. Mr. Gunsallus replaces **G. T. Donahue**, whose promotion to assistant engineer in the office of the chief engineer maintenance of way, at New York, is noted elsewhere in these columns.

**Robert S. Fonda**, work train foreman on the Mohawk division of the New York Central, with headquarters at Fonda, N.Y., has been promoted to assistant supervisor of track on the Syracuse division, with headquarters at Canandagua, N.Y., succeeding **Edward V. Grogan**, who has been transferred to the Buffalo division, with headquarters at Lackawanna, N.Y. Mr. Grogan replaces **John Widner**, who has retired from active service.

**Clarence M. Gregg**, transitman on the St. Lawrence division of the New York Central, with headquarters at Watertown, N.Y., has been promoted to assistant supervisor of track on the St. Lawrence division, with headquarters at Remsen, N.Y., succeeding **F. L. Vault, Jr.**, who has been transferred to Hudson, N.Y., Eastern division, to replace **Francis A. Haley**, who has been appointed bridge and building inspector on the same division as noted elsewhere in these columns.

**F. J. Marino**, assistant supervisor of track on the New York Central, with headquarters at Ashtabula, Ohio, has been promoted to supervisor of track with headquarters at Franklin, Pa., to succeed **C. W. Thornton**, who has been transferred to Ashtabula to replace **F. L. Lemon**, who has been transferred to Elyria, Ohio. Mr. Lemon succeeds **D. C. Martin**, who having reached the age of 70 years, has retired from active service.

Mr. Marino has been associated with the New York Central continuously for nearly 38 years. He was born on July 16, 1881, at Coalburg, Ohio, and after a public school education he entered service with the New York Central on January 29, 1900, as a section laborer. On January 1, 1906, Mr. Marino was made first man in his gang and on May 24 of the following year he was further promoted to section foreman. After somewhat more than a year in the latter capacity he was advanced to extra gang foreman and on June 1, 1920, he was promoted to assistant supervisor of track. His recent advancement to the position of supervisor of track became effective on November 1.

### Bridge and Building

**Francis A. Haley**, assistant supervisor of track on the Eastern division of the New York Central, with headquarters at Hudson, N.Y., has been appointed bridge and building inspector on the same division, with headquarters at Beacon, N.Y., succeeding **John A. Jack**, who was retired from active service on October 31.

**Daniel A. Manning**, assistant supervisor of bridges and buildings on the Wisconsin division of the Chicago & North Western, with headquarters at Chicago, has been promoted to supervisor of bridges and buildings of the same division, to succeed **M. J. Flynn**, who has retired, effective November 1. **James R. Penhalegon**, chief clerk to the division engineer of the Wisconsin division at Chicago, has been promoted to assistant supervisor of bridges and buildings at that point to succeed Mr. Manning.

**Wm. Melchert**, whose appointment as division foreman of buildings on the Michigan Central, with headquarters at Jackson, Mich., was reported in the October issue, was born on March 3, 1883, at Jackson. After obtaining a business college education Mr. Melchert entered the service of the Michigan Central in the fall of 1901 as a machinist helper, later serving as a carpenter in the cab shop. On November 16, 1903, he was transferred to the bridge and building department as a carpenter and on July 15, 1912, he was advanced to foreman carpenter. He was holding the latter position at the time of his recent appointment as division foreman of buildings.

**William Schortemeyer**, bridge and building foreman on the Cleveland, Cincinnati, Chicago & St. Louis, who has been promoted to supervisor of bridges and building, with headquarters at Greensburg, Ind., as reported in the November issue, was born on April 5, 1883, at Cincinnati, Ohio. He entered railway service with the C.C. & St.L. (the Big Four) on March 27, 1907, as a bridge and building carpenter. Mr. Schortemeyer served in this capacity until February 28, 1910, when he was advanced to bridge and building foreman. He was holding the latter position at the time of his appointment as supervisor of bridges and buildings, with headquarters at Greensburg, Ind., which was effective on October 1.

### Obituary

**W. F. Osborne**, assistant engineer on the New York Central in the office of the engineer of structures at New York, died on November 11, in that city.

**Wm. F. O'Brien**, assistant engineer on the New York Central in the office of the engineer of grade crossings at New York, died in that city on November 17.

**A. W. White**, division engineer of the Illinois division of the Chicago & Eastern Illinois, with headquarters at Salem, Ill., died on November 15 in a hospital at St. Louis, following an illness of several months' duration.

**Frank M. Marsh**, who retired in 1902 as chief engineer of the Fremont, Elkhorn & Missouri Valley (now part of the Chicago & North Western), died on November 9 at Ontario, Calif., at the age of 87 years. A native of Dubuque, Iowa, Mr. Marsh entered railway service at an early age and served in engineering capacities on both construction and maintenance, with the Sioux City & Pacific (now part of the C. & N. W.), the Iowa Falls & Sioux City (now part of the Illinois Central), the Sioux City & Pembine, the Chicago, Dubuque & Minnesota and the Chicago, Decorah & Minnesota (now part of the Chicago, Rock Island & Pacific). On February 1, 1898, he was made chief engineer of the Fremont, Elkhorn & Missouri Valley and of the Sioux City & Pacific, which positions he held until September, 1902.

**Alexander F. Stewart**, who retired in 1932 as chief engineer of the Atlantic region of the Canadian National, died at Halifax, N.S., on October 30. During his railway career Mr. Stewart served in engineering capacities with railroads in the United States, Canada and South Africa. He was born at Cape Breton, N.S., and began his railway career in Maine in 1887. Later he returned to Canada and engaged in various engineering capacities, after which he went to South Africa to engage in railway construction work. In 1902 he returned to Canada, where he was connected with an important railroad location project, again going to Africa after the completion of this work. On his return to Canada in 1909, Mr. Stewart was appointed chief engineer of the Canadian Northern, (now part of the C.N.R.) with jurisdiction over the lines east of Port Arthur, Ont. Following the consolidation of the Canadian Northern and the Canadian Government Railways into the C.N.R. in 1920, Mr. Stewart was appointed chief engineer of the lines east of Montreal, with headquarters at Moncton, N.B. On the creation of the Atlantic region in 1923, he was appointed chief engineer of that region, which position he held until his retirement.

**Deep Well Turbine Pumps**—Fairbanks, Morse & Company, Chicago, is distributing two folders describing its line of deep-well turbine pumps with enclosed impellers. Bulletin 6920 deals with oil-lubricated units used for most applications, while Bulletin 6920 R covers water-lubricated units.

## Association News

### Maintenance of Way Club of Chicago

A. B. Hillman, roadmaster, Belt Railway of Chicago, presented a paper on the Reconstruction of the Clearing Yard at a meeting held on November 15, before an audience of 60 members and guests. The next meeting will be held on December 13.

### Bridge and Building Association

President C. M. Burpee (D. & H.) has called a meeting of the Executive committee in Chicago on Saturday, December 11, at which time committees will be selected and the work of the association organized for the year.

### Metropolitan Track Supervisors Club

The next meeting of the club will be held on the afternoon of December 9, at the Hotel McAlpin, New York City, the afternoon meeting being scheduled in connection with the annual dinner of the New York Railroad Club to be held at the Hotel Commodore in the evening. The business session of the meeting will begin at 2 o'clock, following a get-together luncheon at 12:30.

### Roadmasters Association

The Executive Committee met in Chicago on November 29, with President W. O. Frame, Vice-President F. B. La Fleur, Secretary-Treasurer C. A. Lichty, Directors R. L. Sims, W. S. Lacher and T. F. Donahoe, and Past-Presidents C. W. Baldrige and Elmer T. Howson in attendance. Major consideration was given to selection of personnel for committees to study and report on subjects to be considered at the next convention. It was decided that the next convention will be held at the Hotel Stevens, Chicago, on September 20-22, 1938.

### International Railway Maintenance Club

Abrasives and Grinding Wheels as Used in Maintenance of Way Work was the subject discussed at the last meeting of the International Railway Maintenance Club on November 4, at the Hotel Lafayette, Buffalo, N. Y. The meeting was addressed by B. H. Work, sales engineer of the Carborundum Company, and H. C. Jones, specialist on abrasives, of the same company, the former discussing the general action of abrasives, while the latter talked about grinding wheels as applied specifically to maintenance of way work. The comments of these men were supplemented by motion pictures showing manufacturing operations at the main plant of the Carborundum Company.



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for a  
Happy  
Holiday Season  
and a  
Most Prosperous  
New Year

WOODINGS-VERONA TOOL WORKS  
WOODINGS FORGE AND TOOL COMPANY  
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In the election of officers which took place at this meeting, Charles Ericson, of the Canada Machinery Corporation, was elected president, and H. E. Riexinger, engineer of maintenance, International Railway Company, was elected vice-president. The choice of a new secretary-treasurer was deferred for consideration at a later date.

### Wood Preservers Association

Ballots are being distributed to the members containing the recommendation of the Nominating committee for officers for the ensuing year as follows: President, B. M. Winegar, Canada Creosoting Company, Montreal, Que.; first vice-president, C. S. Burt, superintendent, ties and treatment, Illinois Central, Grenada, Miss.; second vice-president, R. E. Meyers, sales manager, International Creosoting & Construction Company, Galveston, Tex.; secretary-treasurer (re-elected), H. L. Dawson; members of Executive committee, W. R. Goodwin, engineer wood preservation, Minneapolis, St. Paul & Sault Ste. Marie, Minneapolis, Minn.; and W. P. Arnold, chemical engineer, The Wood Preserving Corporation, Orrville, Ohio; and members of Nominating committee, W. E. Jackson, superintendent, Santa Fe Tie & Lumber Preserving Company, Somerville, Tex.; R. M. Hamilton, vice-president, T. J. Moss Tie Company, St. Louis, Mo.; R. R. Poux, chief treating inspector, Erie, Marion, Ohio; W. A. Summerhays, manager, Forest Products Inspection & Research Bureau, Illinois Central, Memphis, Tenn.; J. D. Burnes, engineer wood preservation, Page & Hill Company, St. Paul, Minn.; and D. C. Jones, vice-president, The Wood Preserving Corporation, Chicago.

### American Railway Engineering Association

Engineering research conducted under the sponsorship of the Association of American Railroads, will be carried on under the general supervision of the Engineering Research Advisory Committee, recently organized by the Engineering Division. As constituted, the personnel affords representation for the Construction and Maintenance Section (American Railway Engineering Association), the Signal Section, and the Electrical Section. The personnel is as follows: J. C. Irwin (chairman), valuation engineer, Boston & Albany, Boston, Mass. (chairman Engineering Division, and Construction and Maintenance Section); B. J. Schwendt, assistant signal engineer, New York Central, Cincinnati, Ohio (chairman, Signal Section); H. F. Brown, assistant electrical engineer, New York, New Haven & Hartford, New Haven, Conn. (chairman, Electrical Section); F. E. Morrow, chief engineer, Chicago & Western Indiana, Chicago (first vice-chairman, Construction and Maintenance Section); E. M. Hastings, chief engineer, Richmond, Fredericksburg & Potomac, Richmond, Va. (second vice-chairman, Construction and Maintenance Section); E. P. Weatherby, signal engi-

neer, Texas & Pacific, Dallas, Tex. (vice-chairman, Signal Section); and D. B. Thompson, mechanical and electrical engineer, New York Central, New York, (vice-chairman, Electrical Section).

Amendments to the constitution of the A.R.E.A., proposed by the Board of Direction and submitted to the membership by letter ballot have been carried. Among the amendments approved is one that provides for the appointment of the secretary by the board instead of his election by the membership at large. This matter will come up for consideration at the meeting of the Board of Direction to be held in New York on December 9. The Nominating Committee will meet on the same day.

Only four committees held meetings during the last month, namely, Maintenance of Way Work Equipment, at New Orleans, La., on November 15 and 16; Economics of Railway Location, at New York on November 17; Buildings, at Richmond, Ind., on November 16 and 17; and Records and Accounts, at Chicago on November 30. Only one committee, that on Water Service, Sanitation and Fire Protection, is scheduled to hold a meeting this month—at New York on December 8.

Bulletin 399, containing the second group of committee reports, was mailed to the members late in November. It includes the reports of five committees concerned with bridges and trestles. The remaining reports will appear in bulletins that will be issued in January, February and March, respectively.

## Supply Trade News

### Personal

**W. H. Reeves**, manufacturers agent, St. Louis, Mo., effective November 11, was appointed a representative for the **Nordberg Manufacturing Co.**, Milwaukee, Wis., in the sale of track machinery, succeeding **C. E. Irwin**, deceased.

**Murray B. Wilson** of the Detroit sales district office of the **American Rolling Mill Company**, Middletown, Ohio, has been appointed manager of the New York sales district, to succeed **Cliff Spear**, who has been forced to curtail his activities because of continued ill health.

**C. Parker Holt**, executive vice-president of the **Caterpillar Tractor Co.**, Peoria, Ill., has been appointed vice-president at San Leandro, Cal., where he will direct all activity and co-ordinate the work of the several departments with those in Peoria. He has been succeeded by **A. T. Brown**, vice-president administering the accounting, treasury, traffic and parts departments. **L. B. Neumiller**, director of industrial relations, has been elected vice-president in charge of the parts, service, traffic and industrial relations departments. **D. G. Sherwin**, treasurer, has been elected vice-president in charge of the advertising, sales and treas-

ury departments, and has been succeeded by **D. A. Robison**, assistant treasurer.

**Stanley H. Smith**, president of the **Stanley H. Smith Company**, Cleveland, Ohio, has been appointed manager of railway sales of the **Philadelphia Steel & Wire Corporation**, Philadelphia, Pa., effective December 1. Mr. Smith's headquarters will continue, as heretofore, in the Midland building, Cleveland, with offices also in New York and Chicago.

**Benjamin F. Fairless**, who has been elected president of the **United States Steel Corporation**, as reported in the November issue, was born at Pigeon Run, Ohio, on May 3, 1890. After completing school at Justus, Ohio, he taught school for two years at Rockville, Ohio, and Navarre. He then enrolled in Wooster (Ohio) college and later transferred to Ohio Northern university, where he was graduated with a civil engineering degree. A few years ago this university



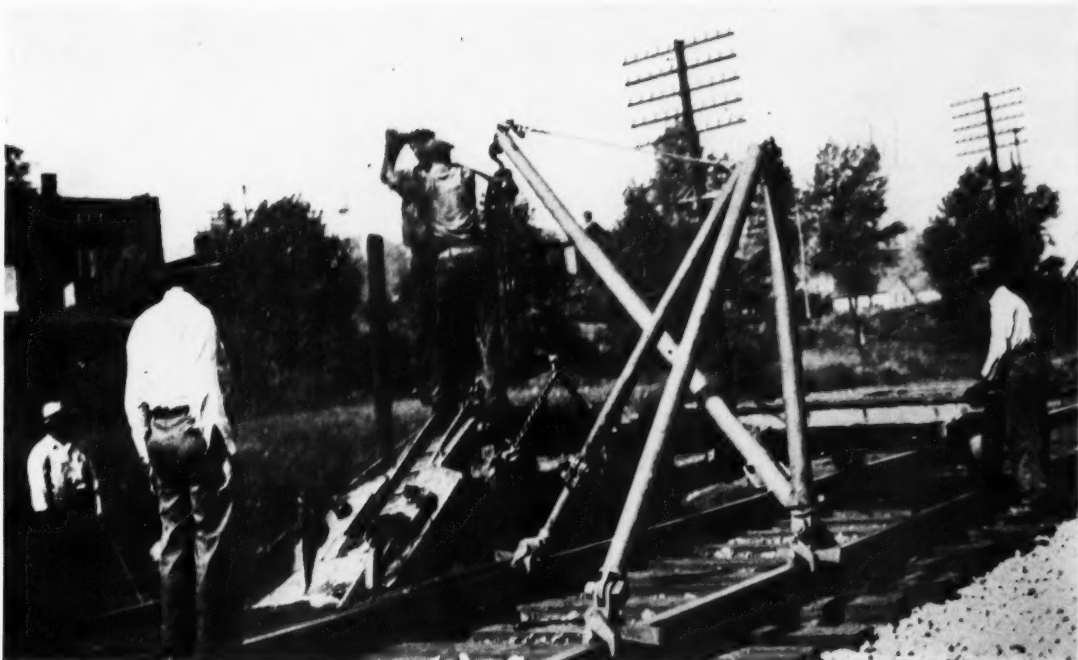
Benjamin F. Fairless

conferred upon him the honorary degree of doctor of engineering. He began railroad work in June, 1913, as a civil engineer for the Wheeling & Lake Erie. In August of the same year he became a civil engineer for the Central Steel Company of Massillon, later becoming in turn mill superintendent, general superintendent, and vice-president in charge of operations. When the United Alloy Steel Corporation and the Central Steel Company merged in September, 1926, Mr. Fairless was made vice-president and general manager of United Alloy Steel, and in April, 1928, he became president and general manager of the company. When this company, in April, 1930, was one of several united in the formation of the Republic Steel Corporation, Mr. Fairless went into the new organization as executive vice-president. When the Carnegie-Illinois Steel Corporation was formed in the autumn of 1935 from the Carnegie Steel Company and the Illinois Steel Company, both units of the United States Steel community of companies, Mr. Fairless was made president, which position he held until his recent election to the presidency of the United States Steel Corporation.

**Robert Gregg**, vice-president of the **United States Steel Corporation**, who has

# MOLES

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### **RAILWAY MAINTENANCE CORPORATION**

**Pittsburgh, Pa.**

been elected president of the **Tennessee Coal, Iron & Railroad Co.** (a subsidiary of U. S. Steel), is 52 years of age and a native of Atlanta, Ga. He was educated in the Atlanta public schools and Georgia School of Technology, and was graduated from Cornell University. He began his business career in August, 1907, with the Atlanta Steel Company of Georgia, continuing with that company and its successor, the Atlantic Steel Company, until



Robert Gregg

August 1, 1932. He then resigned to accept the vice-presidency of the Tennessee Coal, Iron & Railroad Co., and was advanced in October, 1933, to the presidency of that company. On February 1, 1935, he was appointed vice-president in charge of sales of the United States Steel Corporation, from which position he now returns to the T.C.I. & R.R.

**J. L. Perry**, president of the **Tennessee Coal, Iron & Railroad Co.**, who will become president of the **Carnegie-Illinois Steel Company** (both companies are subsidiaries of the **United States Steel Corporation**) on January 1, was born at Worcester, Mass., on March 11, 1881, and was educated in the grade and high schools



J. L. Perry

of Worcester. He began his business career with the American Steel & Wire Co., in its Worcester plant in 1899, and, after occupying various positions, became manager of the Worcester district of this company in 1928. On January 1, 1933, he

was promoted to the vice-presidency of the American Steel & Wire Co., in charge of operations, with headquarters at Cleveland, Ohio, and in February, 1935, was elected president of the Tennessee Coal, Iron & Railroad Co., of Birmingham, Ala.

**L. W. Wallace**, director of engineering research of the Association of American Railroads, has resigned to become director of engineering and research of the **Crane Company**, Chicago, effective December 1. This newly-created division of the Crane Company will comprise the existing division of research and development and the product engineering department and has been formed to co-ordinate all engineering activities and further progress in diversified fields. The importance and growth of this technical work, according to the Crane Company, has proved the advisability of maintaining a complete and well-staffed engineering division, free from all responsibilities except those relating to engineering, research, design and experimental work. Mr. Wallace will be directly responsible to the president and under his supervision the division will conduct the necessary research and engineering to develop present and new products.

**H. A. Morrison** and **Robert E. Thayer** have been elected vice-presidents of the **Simmons-Boardman Publishing Corporation**, publishers of *Railway Engineering*



H. A. Morrison

and *Maintenance*, the *Railway Age* and other transportation periodicals. Mr. Morrison is western manager of the railway magazines published by this company and business manager of *Railway Signaling* at Chicago, and Mr. Thayer is New England manager of the same publications and business manager of the *Railway Mechanical Engineer*, with headquarters at New York.

Mr. Morrison was born on December 21, 1892, at Indianapolis, Ind., and studied electrical engineering at Purdue University. He began his business career in 1912 by entering the traffic department of the Pennsylvania at Indianapolis where he remained until 1915. In that year Mr. Morrison left the Pennsylvania to go with the Chicago, Rock Island & Pacific as a special apprentice in the electrical department at Silvis, Ill. In June, 1918, he was transferred to the office of the general

mechanical superintendent at Chicago, where he remained until September 1, 1919, when he resigned to become sales engineer for the United States Light & Heat Corp., Chicago, being advanced to district manager of the railway sales department on May 1, 1924. On May 1, 1925, Mr. Morrison resigned to enter the service of the Simmons-Boardman Publishing Corporation as a sales representative at Chicago. On July 1, 1930, he was appointed business manager of *Railway Signaling*, a Simmons-Boardman publication, and on August 2, 1932, he was promoted to western manager in charge of sales in the western territory for all railway publications of the company, at the



Robert E. Thayer

same time continuing as business manager of *Railway Signaling*. In the capacity of vice-president of the company, Mr. Morrison will retain the responsibilities of both these positions.

Mr. Thayer was born at Chelsea, Mass., on August 4, 1883, and received his higher education at Massachusetts Institute of Technology, from which he graduated in mechanical engineering in 1907. Immediately upon leaving the institute, he entered the service of the American Locomotive Company as a special apprentice. In 1908 he returned to the institute as an instructor in mechanical engineering. During 1910 he served as a draftsman in the mechanical department of the Boston & Maine at Boston, Mass. In the following year he entered the service of the Simmons-Boardman Publishing Corporation as an associate editor on the staff of the *Railway Age Gazette* (now *Railway Age*). In January, 1917, he became mechanical department editor of the *Railway Age* and managing editor of the *Railway Mechanical Engineer*, and in 1919 he was promoted to European editor of the *Railway Age* and associated Simmons-Boardman publications, with headquarters at London, England. Early in 1922 he returned to the United States to become New England advertising manager of all Simmons-Boardman transportation publications. In June, 1929, he became, in addition, business manager of the *Railway Mechanical Engineer*, and, later, business manager of the *Car Builders'* and *Locomotive Cyclopedias*. He continues to retain these responsibilities in his new capacity as vice-president.

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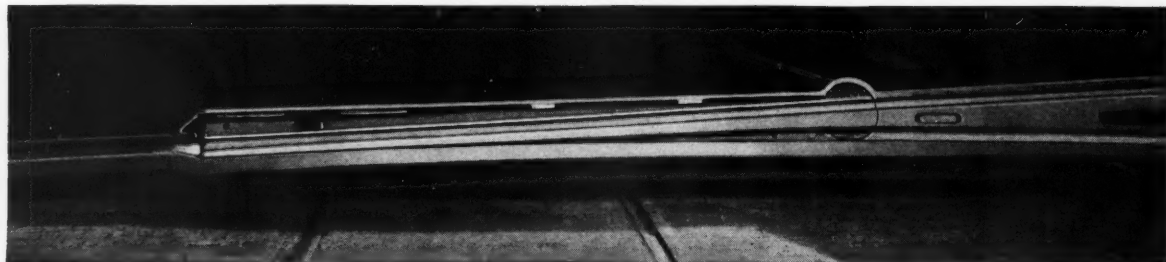
have served for a number of years in tunnels and terminals, and out on running track.

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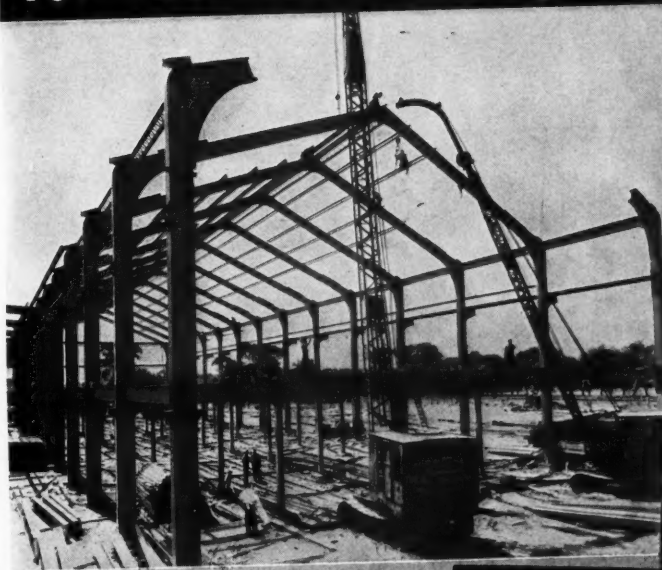
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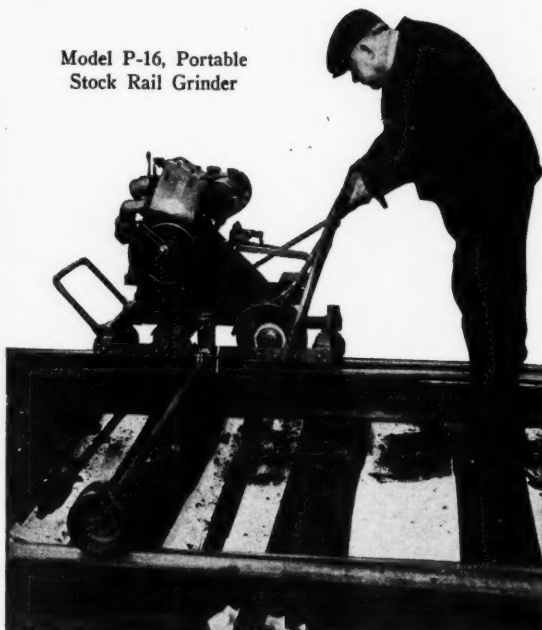
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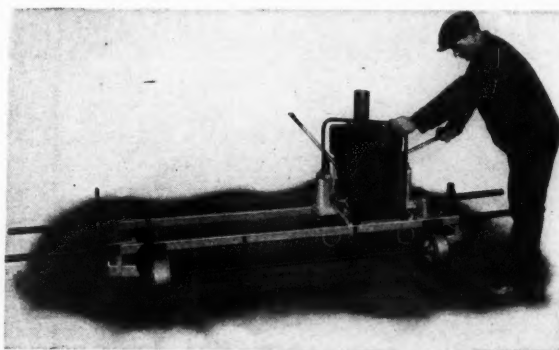
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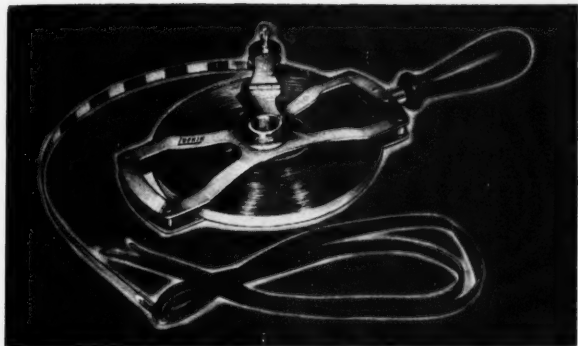
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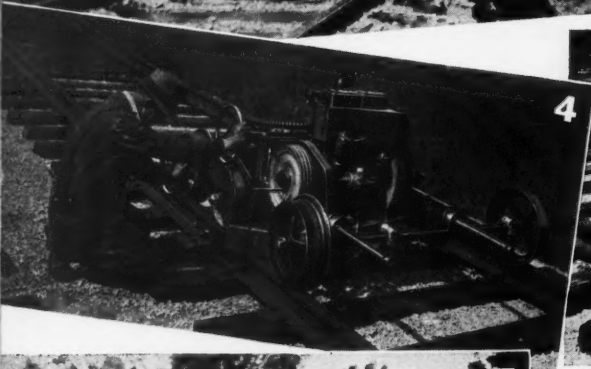
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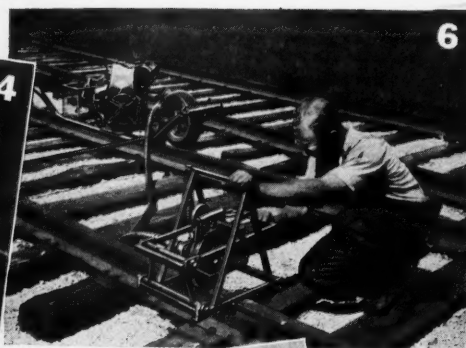
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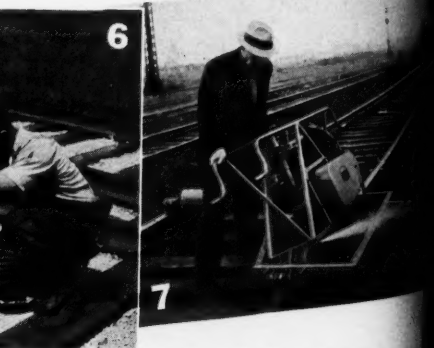
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